

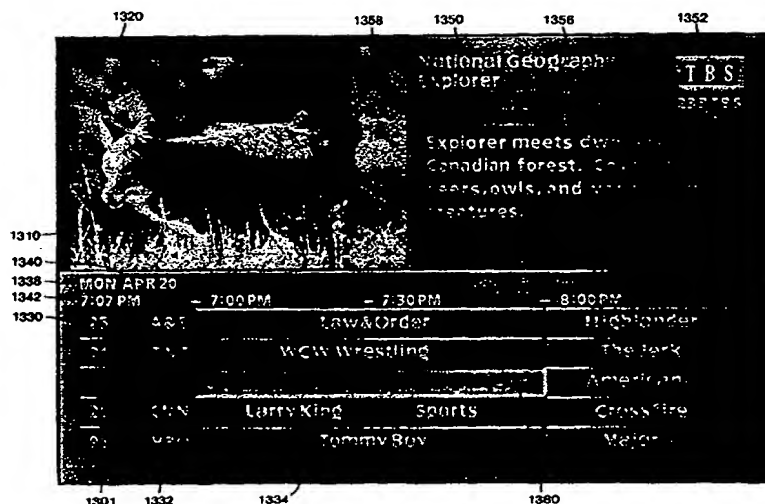
PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION  
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> : <b>H04H 1/02, H04N 5/445, 5/50, 7/08, 7/10</b>		<b>A1</b>	(11) International Publication Number: <b>WO 99/21308</b>
			(43) International Publication Date: 29 April 1999 (29.04.99)
(21) International Application Number: PCT/US98/21991 (22) International Filing Date: 16 October 1998 (16.10.98) (30) Priority Data: 08/953,031      17 October 1997 (17.10.97)      US 08/953,035      17 October 1997 (17.10.97)      US (71) Applicant: SONY ELECTRONICS, INC. [US/US]; 1 Sony Drive, Park Ridge, NJ 07656 (US). (72) Inventors: MUGURA, Kazuto; 1 St. Francis Place #6209, San Francisco, CA 94107 (US). NOGUCHI, Fujio; 11761 Sierra Spring Court, Cupertino, CA 95014 (US). OTA, Takaaki; 11572 Windcrest Lane #1513, San Diego, CA 92128 (US). (74) Agents: SOBRINO, Maria, E. et al.; Blakely, Sokoloff, Taylor & Zafman, 7th floor, 12400 Wilshire Boulevard, Los Angeles, CA 90025-1026 (US).		(81) Designated States: AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.          Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>	

(54) Title: A METHOD AND APPARATUS FOR DISPLAYING AN ELECTRONIC PROGRAM GUIDE



## (57) Abstract

A method and apparatus for channel surfing while using an electronic program guide (1301) are provided. A multiple channel broadcasting system is tuned to a first channel to provide a display of a broadcast of a first program on a screen. An electronic program guide (1301) is displayed that identifies a plurality of channels and programming on the channels. A first display information packet (1302) containing a description of the first program is displayed with the electronic program guide. A system pointer is manipulated in response to input by the user to an area of the electronic program guide associated with a second program. The display of the first display information packet (1302) is subsequently replaced with a display of a second display information packet containing a description of the second program. A method for providing a status indication of a tuner and a pointer in a multiple channel broadcasting system are also provided.

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakhstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

## A METHOD AND APPARATUS FOR DISPLAYING AN ELECTRONIC PROGRAM GUIDE

### FIELD OF THE INVENTION

The present invention relates to the presentation of channel, program, and broadcast information for a multiple channel television broadcast system.

### BACKGROUND OF THE INVENTION

Television broadcasting technology has improved tremendously since its inception. Today, television signals are broadcasted on the airwaves, through cables, and via satellite. The number of stations accessible today has increased to hundreds of stations. To select a program to view, many viewers simply "channel surf" until they find a channel that has a desirable program. Channel surfing refers to the process of using the channel "+" or "-" key to sequentially view each channel. Although some viewers find channel surfing among hundreds of stations enjoyable, most viewers prefer a more direct method for selecting a program to view.

Some prior art television channel selection guides provide a television channel selection guide which displays a listing of the channels typically in numeric order and the titles of the programs broadcasted or to be broadcasted on the channels. A simplified block diagram of such a guide is illustrated in Figure 1. The viewer or user of the system may then select the channel by entering in the channel number or selecting a program. The system responds by removing the guide displayed and tuning to the station selected and displaying the broadcast signals of the station.

This system has a number of drawbacks. First, the guide provides only the title of the program. To get additional information, such as a written description of the program, the user must select an information button which responds by bringing up a second layer of the menu having the program description. Thus, as the number of

stations increase, the efficiency of reviewing programs and program descriptions decreases.

Furthermore, many viewers prefer to preview an actual broadcast on a station before selecting that station for viewing. In the prior art systems, the user has to select each station to view, and subsequently go back to the channel guide in order to view program titles on other channels. While other prior art systems may provide a program listing having a transparent background superimposed over a program broadcast, it is still difficult to view the program broadcast through the program listing.

Moreover, in any television system a user can channel surf by skipping from channel to channel in sequence using the channel "up" or "down" buttons. However, when channel surfing in the prior art systems, the user is unable to take advantage of the channel listing and program description information. While some prior art television channel selection guides allow for channel surfing while the guide is displayed, these systems change the channel as the user moves a selection device or pointer to each new channel. Again this prevents taking full advantage of the broadcast system guide because, while the system guide provides program descriptions, a user might like to view a particular channel while surfing among the program descriptions of other channels.

Another shortcoming of prior art television channel selection guides is that, while providing the current time on the guide display, they do not provide a clear representation of the current time in relation to the channel program listings. Consequently, it is difficult for a user to ascertain the amount of time elapsed since a particular program began.

In the current generation of broadcasting technology, a viewer is provided with many options regarding programs that are available for broadcast. These options include, but are not limited to, on-demand selection of pay-per-view broadcasts, selection of a broadcast for automatic recording, and programming a broadcast system to tune to a preselected station at a designated time. As the number of options

increases, so to does the need for a user-friendly system interface. The prior art channel selection guides do not provide a ready status indication as part of the channel selection guide. In addition, as the channel selection guides become more interactive and provide the viewer with more selections, the lack of status displays for system pointers and tuners can lead to a great deal of viewer frustration.

#### SUMMARY OF THE INVENTION

A method and apparatus for displaying programming information by translating the display of a broadcast of a program are provided. According to one aspect of the invention, a multiple channel broadcasting system is tuned to a channel to provide a display of a broadcast of a program on a screen. Programming information is displayed that identifies channels in the broadcasting system. When displaying the programming information, the display of the program broadcast is translated to a smaller broadcast window on the screen. The translation comprises two steps. One step superimposes at least one of a series of successively smaller broadcast window outlines over the display of the broadcast on the screen. Another step displays the broadcast in the smaller broadcast window. Therefore, the programming information is displayed along with the program broadcast on the screen such that no portion of the broadcast is covered by the programming information. Thus, a viewer has an unobstructed view of the selected program while simultaneously accessing the channel program selections of the programming information. The programming information includes an electronic program guide, a display information packet, an electronic category guide, and an electronic subcategory guide.

A method and apparatus for channel surfing while using an electronic program guide are provided. According to one aspect of the invention, a multiple channel broadcasting system is tuned to a first channel to provide a display of a broadcast of a first program on a screen. An electronic program guide is displayed that identifies a plurality of channels and programming on the channels. A first

display information packet containing a description of the first program is displayed with the electronic program guide. The broadcast system displays a system pointer. The system pointer is manipulated in response to input by the user to an area of the electronic program guide associated with a second program. The display of the first display information packet is subsequently replaced with a display of a second display information packet containing a description of the second program. The broadcast system remains tuned to the first program while the user views program information for a second program on a second channel.

A method and apparatus for providing a status indication of a tuner and a pointer in a multiple channel broadcasting system are also provided. According to one aspect of the invention, the multiple channel broadcasting system is tuned to a channel to provide a display of a broadcast of a program on a screen. An electronic program guide is generated that identifies a plurality of channels and programming on the channels. A system pointer is supplied that points to a location in the electronic program guide that identifies a channel program in the broadcasting system. An indication is provided to the user as to the status of the broadcasting system tuner and the system pointer. The status is indicated by displaying a program block of a corresponding program on the electronic program guide as appearing to be depressed into the screen when the broadcasting system is tuned to the channel program. The status is indicated by displaying a program block of a corresponding program on the electronic program guide as appearing to be protruding from the screen when the broadcasting system is not tuned to the channel program. The status is indicated by displaying a program block of a corresponding program as highlighted when the system pointer is pointing to the channel program. The status is indicated by displaying a program block of a corresponding program as unhighlighted when the system pointer is not pointing to the channel program.

These and other features, aspects, and advantages of the present invention will be apparent from the accompanying drawings and from the detailed description and appended claims which follow.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The objects, features, and advantages of the present invention will be apparent to one skilled in the art from the following detailed description in which:

**Figure 1** is a simplified illustration of a prior art direct digital satellite system guide display.

**Figure 2** is a simple illustration of one embodiment of the present invention.

**Figure 3** is a block diagram representation of the elements utilized in the receiver of the television signals.

**Figure 4** is a representation of a remote control utilized to tune television stations in accordance with the teachings of the present invention.

**Figure 5** is a simplified block diagram of the circuitry utilized in a remote control device.

**Figure 6** illustrates the type of data utilized to present the electronic program guide in accordance with the teachings of the present invention.

**Figure 7** illustrates the pointers to the data utilized to generate the electronic program guide in accordance with the teachings of the present invention.

**Figure 8** illustrates the Master Guide presented to enable the viewer to view programming that is broadcast and is to be broadcast.

**Figures 9A, 9B and 9C** illustrate one embodiment of the present invention in which a broadcast audio and video is displayed behind the Master Guide.

**Figure 10** is an exemplary flowchart illustrative of translating a display to a small window in one embodiment of the present invention.

**Figure 11** illustrates a broadcast display in one embodiment of the present invention.

**Figure 12** illustrates superimposing successively smaller broadcast window outlines over a broadcast display in the translation of the broadcast window in one embodiment of the present invention.

**Figure 13** illustrates the display of an electronic program guide along with a program broadcast on a screen in one embodiment of the present invention.

**Figure 14** is an exemplary flowchart that illustrates integrating the translation of a display to a small window with other functions of a broadcast system in one embodiment of the present invention.

**Figure 15** illustrates the display of an electronic program guide in one embodiment of the present invention.

**Figure 16** is an exemplary flowchart illustrative of the process for optimizing the font size for an available display space in one embodiment of the present invention.

**Figure 17** is an exemplary flowchart illustrative of the process for integrating the process of optimization of the font size with other functions of a broadcast system in one embodiment of the present invention.

**Figure 18** is an exemplary flowchart illustrative of channel surfing in one embodiment of the present invention.



**Figure 19** is an exemplary flowchart illustrative of the process for providing tuner and pointer status display in one embodiment of the present invention.

**Figure 20** illustrates the display of an electronic program guide in one embodiment of the present invention.

**Figure 21** illustrates the display of an electronic subcategory guide with an electronic program guide in one embodiment of the present invention.

**Figure 22** is an exemplary flowchart that illustrates the process for providing an icon to indicate program status in one embodiment of the present invention.

**Figure 23** illustrates the display of an electronic program guide having program status icons in one embodiment of the present invention.

**Figure 24** is an exemplary flowchart that illustrates a process for providing a time bar with a current time marker in one embodiment of the present invention.

**Figure 25** illustrates the display of an electronic program guide having a graphical representation of the current time in relation to the times of channel programming in one embodiment of the present invention.

**Figure 26** is an exemplary flowchart that illustrates the process for providing an on-screen menu having differing transparency levels in one embodiment of the present invention.

**Figure 27** illustrates the display of an on screen menu having differing transparency levels in one embodiment of the present invention.

## DETAILED DESCRIPTION OF THE INVENTION

In the method and apparatus of the present invention the broadcast system described is a direct broadcast satellite system. However, it is readily apparent to one skilled in the art that other broadcast systems which have the capability of receiving and displaying a multiplicity of stations may utilize the method and apparatus of the present invention. Furthermore, in the following description, for purposes of explanation, numerous details are set forth, such as menus, flowcharts and system configurations, in order to provide a thorough understanding of the present invention. However, it will be apparent to one skilled in the art that these specific details are not required in order to practice the present invention. In other instances, well known electrical structures and circuits are shown in block diagram form in order not to unnecessarily obscure the present invention.

Figure 2 is a simplified diagram illustrating a Direct Satellite System (DSS). The system has an antenna 3, an integrated receiver/decoder 2 (IRD), a remote controller 5, and a monitor 4. Packets of data are transmitted by a transponder on the satellite. Each transponder transmits data in a time share manner at a predetermined frequency. A tuner 21 of a decoder is tuned in to the frequency of the transponder corresponding to a channel, which is designated by a viewer so that the packets of digital data are received by the decoder.

The antenna 3 receives an encoded data signal sent from a satellite. The received encoded signal is decoded by the IRD. The antenna 3 has a low noise block down converter 3a (LNB). The LNB 3a converts a frequency of a signal sent from the satellite to another frequency. The converted signal is supplied to the IRD 3. The monitor 4 receives a signal from the IRD 3.

Figure 3 is a block diagram of the IRD 3. A radio frequency (RF) signal output from the LNB 3a of the antenna 3 is supplied to a tuner 21 of a front end 20. The output from the tuner 21 is supplied to a quadrature phase shift keying (QPSK) demodulation circuit 22 for demodulation. The output from the QPSK demodulation circuit 22 is supplied to an error correcting circuit 23 for error correction. The data is received in encrypted and encoded (i.e., compressed) form.

The transport IC 24 receives the data stream, consisting of packets of data, from the error correcting circuit 23 and directs portions of the data stream to the appropriate circuit for processing. The digital data stream sent from a satellite includes headers for classifying the different portions of the data in the digital data stream. The transport IC stores the headers in registers and uses the headers to direct the data. The data stream sent from the satellite, includes video data in the format specified by the Motion Pictures Expert Group standard (MPEG), MPEG audio data and electronic programming guide (EPG) data. Data that is identified by its header to be video data is transferred to MPEG video decoder 25. Data that is identified by its header to be audio data is transferred to MPEG audio decoder 26. Similarly, data having a header that identifies the data to be EPG data is transferred to a predetermined area in the data buffer 51 designated to store the EPG.

A conditional access module 33, includes a central processing unit (CPU), a read-only memory (ROM) and a random access memory (RAM). The conditional access module determines whether the user has the authorization to receive certain data, e.g., audio/video for a pay TV station, using the authorization information stored in its memory. Thus, if the conditional access module determines that the user is authorized access, a key to decrypt the incoming data is provided to the transport IC 24, which decrypts the data using the key provided. In one embodiment, a smart card is utilized. This card is inserted into the card reader interface 32 for interface to the transport IC 24. It is readily apparent to one skilled in the art that the

conditional access module is not limited to smart cards and may be configured in other kinds of circuitry.

The MPEG video decoder 25 decodes the video signal received from the transport IC. Dynamic random access memory (DRAM) 25a, connected to the MPEG video decoder 25, is used for buffering and storage of video data during processing by the MPEG video decoder. The decoded digital video signal is supplied to a National Television System Committee (NTSC) encoder 27 and converted to a luminance signal (Y) and a chroma signal (C) which are respectively output through a buffer amplifier 28Y or 28C as an S video signal. A composite video signal is also output through a buffer amplifier 28V.

The MPEG audio decoder 26 decodes the digital audio signal. DRAM 26a, connected to the MPEG audio decoder 26, is used for buffering of data and information during processing by the MPEG audio decoder 26. The decoded digital audio signal is converted into an analog audio signal by D/A converter 30. The left audio signal is output through buffer amplifier 31L and the right audio signal is output through buffer amplifier 31R.

An RF modulator 41 mixes a composite signal output from the NTSC encoder 27 with an analog audio signal output from the D/A converter 30. The RF modulator 41 converts the mixed signal into an RF signal and outputs the RF signal therefrom.

The CPU 29 is the central control mechanism and executes code stored in the ROM 37 to perform certain functions of the system. For example, the CPU processes certain data to control the generation of the program list in accordance with the teachings of the present invention. In addition, the CPU receives and processes the user input, received from the front panel buttons or switches 40 and the photodetector circuit 39 to provide the user functionality and access to the system described herein. In addition, the CPU accesses user settings/preferences for processing of information and configuration

of the system. The user settings are stored in the non-volatile memory, such as electrically erasable programmable read-only memory (EEPROM) 38. In addition, the CPU maintains a list of pointers, stored in static random access memory (SRAM) 36, to the channel information and program information stored in the SRAM 51. Thus, when a user wishes to display a form of the EPG on the screen, the CPU 29, accessing pointers stored in the SRAM 36, communicates to the transport IC 34 to retrieve the data from the data buffer (SRAM) 51 identified by the pointers. The CPU then formulates the format and other digital data which forms the guide or list on the screen and forwards the data representative of the guide/list to the transport IC 34 which forwards the data to the DRAM 25a of the MPEG video decoder 25 for subsequent output to the screen.

Figure 4 shows an example of a remote controller utilized by a user to transmit commands and make program selections in accordance with the teachings of the present invention. Figure 5 is simplified a block diagram of the remote controller. The remote controller 400 has an infrared originating device 405, a set of operation buttons 410, a CPU 415, a ROM 420 and a RAM 425. The CPU 415 receives a signal sent from an operation button 410 through an input port 430. The signal is processed according to a program stored in the ROM 420. The RAM 425 is used as a working space so as to produce a transmitting code. The transmitting code is sent to the infrared originating device 405 through an output port and converted into an infrared signal. The infrared signal is transmitted to the IRD. The operation buttons 410 include a direction key for designating a pointer direction such as north, south, east and west, an "EPG" key, a "FAVORITE" key, a "SELECT KEY", a "MENU" key, an "EXIT" key, a ten-key numeric keypad and an "ENTER" key. The set of operation buttons 410 enable the user to select programs through the electronic programming guide in accordance with the teachings of the present invention.

Figure 6 is a block diagram illustration of the data stored in a portion of the data buffer RAM 51. As noted above, the RAM 51 stores EPG data including guide data, channel data, and program data. General information is included in the guide data, for example, the current date and time. The transponder list identifies the number of the transponder transmitting a segment. The channel list identifies the channel number of the first channel of a portion of data. The channel data includes data relating to channels, such as the channel number, channel name (i.e., the call sign of a broadcast station), logo ID (i.e., an identification of the channel logo), data ID, which is an identification of a channel number of MPEG video data or MPEG audio data, number of programs, which identifies the number of programs to be transmitted on a channel during a predetermined time frame, and first program offset which identifies the offset from the header to the first channel data in a segment.

The program data includes the program title, start time of the program, time length of the program, program category such as movies, news, sports, etc., program subcategory such as drama, horror, children's movies or baseball, basketball, football for the sports category, the movie rating and program description that provides a detailed description of the program.

Figure 7 illustrates how pointers to the EPG data are sorted for display on a guide on the user's television screen. As noted above, EPG data includes guide data, channel data and program data which are stored in the Data Buffer (RAM) of the IRD (as shown in Figure 3). When a viewer selects a channel, the CPU of the system determines the packet containing the channel information and extracts the transponder number from the channel information. The system front end starts tuning in the frequency of the designated transponder so as to receive the data transmitting from that transponder. If a viewer does not select any channel, the last channel is designated.

As noted above, the CPU generates a table of pointers 736 to the EPG stored in the memory. The table 736 is used for changing the order of channels or programs according to the information to be presented in the guide to the user. The table 736 includes an entry for the address pointer to the corresponding channel data and an entry to the corresponding program data.

A table for generating display information is stored in the ROM 37. Certain data from the table is read out from the ROM 37 and stored in DRAM 25a. Preferably the data is stored in compressed form. Therefore, when a character is displayed on a screen, the compressed character array is decoded so as to generate the character to be displayed. The encoder references a dictionary which includes a set of words and frequently used portions of words and numbers corresponding to each word or portion of a word. The encoder encodes each word to each number by using the dictionary. The decoder references the same dictionary as the encoder to perform the decode function. Once decoded, each character of the decoded word includes a character code corresponding to an American Standard Code for Information Interchange (ASCII) code. Nonvolatile memory (e.g., EEPROM 38) has two tables. The first table contains character bitmaps in the different fonts available for each character. The second table identifies the address in the first table at which to extract the character bitmap. The address is determined according to the character code. The bit map image of the character is transmitted to DRAM 25a and subsequently accessed to display the character on the screen.

In one embodiment of the present invention, the channel data is received from a predetermined transponder and the channel number and channel name are stored in DRAM 25a. Additional channel information such as the channel logo is stored in the ROM 36. The ROM 36 preferably includes a table of Logo IDs and the address of Logo Data stored in ROM 36. Therefore, once a Logo ID is

determined, the address of the Logo Data is determined, retrieved and stored in DRAM 25a.

The channel data provides the beginning address of the program data for a particular program. The actual location on the screen at which the program information is displayed is dependent upon the format of the guide. For example, in a time-based system, the location where the program title is displayed is determined by the start time and time length stored in the program data.

Using this information downloaded from the satellite transmission, programming and channel selection information is provided to the viewer. In the system and method of one embodiment of the present invention, this information is provided to the user in an innovative manner in order to enable the viewer to easily determine and select stations or programs to be viewed. For example, **Figure 8** illustrates a Master Guide that provides such information as the channel call sign 810, channel number 815 in the system, the channel logo of the selected station 820, a highlight 825 indicating the location of the system pointer operable by the arrow direction buttons, a program description 830 for the program the system pointer is located at, as well as program time information 835.

This guide is superimposed on the broadcast of channel 840 at which the system pointer is located. Thus, the user not only is provided the television system data showing the television channels, times of programming broadcasts and descriptions of programs, but is also provided the audio and video of one channel, all on the same menu level of the guide. By movement of the pointer 845 (in the present example, by manipulation of the information highlighted), the channel tuned to will change automatically, enabling the user to stay in the menu while still previewing in part the actual channel highlighted on the guide. This process is illustrated by **Figures 9A, 9B, and 9C**. The discussion will now turn to general process flows for an embodiment of the present invention.



It is readily apparent to one skilled in the art that additional functions can be added to the process and functions modified or removed and still be within the spirit and scope of the invention. The system provides an innovative and user friendly access to a wealth of information regarding programming available through the broadcasting system. In the present invention a number of functions are selectable through the remote control device. It is apparent that these functions may be selectable through other devices such as a joystick or other means such as an on screen menu.

**Figure 10** is an exemplary flowchart illustrative of translating a display to a small window in one embodiment of the present invention. The resizing process provides innovative feedback to the user while providing the broadcast system time to perform the computations necessary to resize the window. In the present embodiment, the broadcast display is translated to a small window when the user selects to display the electronic program guide. Thus both the broadcast and the electronic program guide are displayed without overlap. It is readily apparent that the window resizing process can be used to resize windows for a variety of purposes.

Referring to **Figure 10**, operation begins at Block 1000, at which a broadcasting system is tuned to a channel to provide a display of a broadcast of a program. The broadcast window corresponds to the entire display. **Figure 11** illustrates a broadcast display 1102 in one embodiment of the present invention. It is readily apparent that the window size need not initially correspond to the entire display but can be some portion of the display. Operation continues at Block 1002, at which a series of successively smaller broadcast window outlines are superimposed over the program display when it is desirable to translate to a smaller window. **Figure 12** illustrates superimposing these successively smaller broadcast window outlines 1202-1210 over a broadcast display 1201 in the translation of a broadcast window in one embodiment of the present invention. With reference to **Figure 12**,

outline 1202 is displayed first, followed by outlines 1204, 1206, 1208, and 1210, respectively. Preferably, outline 1202 is shorter in length and narrower in width than the screen perimeter 1220, although it is contemplated that the outlines can progress in one dimension. Each of outlines 1204, 1206, 1208, and 1210 is shorter in length and narrower in width than the preceding outline, respectively.

Referring again to **Figure 10**, operation continues at Block 1004, at which the program display is translated to a smaller broadcast window. Preferably the size of the broadcast window is not changed until the size of the smallest superimposed broadcast window outline equals a predetermined smallest broadcast window size. In an alternate embodiment, the size of the broadcast window changes as the size of the outline changes.

Operation continues at Block 1006, at which programming information in the form of an electronic program guide is displayed on the screen with the broadcast on the screen such that no portion of the broadcast is covered by the electronic program guide. In an alternate embodiment, programming information is displayed performed prior to the translation of the program broadcast.

**Figure 13** illustrates one embodiment of a display of an electronic program guide 1301 with the program broadcast 1310 on a screen 1320. The electronic program guide 1301 includes the broadcast channel number 1330, the broadcast network identification 1332, the program title 1334, the start and end times for a program 1336, the current day 1338, the current date 1340, and the current time 1342. It is readily apparent that other embodiments of displays of electronic program guides presenting different information may be utilized.

Referring to **Figure 13**, a user is able to readily view not only the broadcast audio and video, but also the electronic program guide of programming and the program description. A display information packet 1302 containing a description of the program broadcast may be

displayed with the electronic program guide 1310. The display information packet 1302 also contains the program title 1350, the broadcast network identification 1352, the broadcast channel number 1354, the start and end times of the program 1356, and the program rating 1358. Alternatively, the user may selectively replace the display of the display information packet 1302 with the display of an electronic category guide. The electronic category guide contains a listing of programming categories.

After viewing the programming selections on the electronic program guide, a viewer may deselect the electronic program guide display. The electronic program guide display is also deselected upon selection of a channel by the user. Upon deselection of the electronic program guide, the broadcast system translates the broadcast of a program displayed in the small window by superimposing a series of successively larger broadcast window outlines over the display. In the present embodiment, the first larger broadcast window is longer in length and wider in width than the small window in which the program is displayed. Each successive outline is longer in length and wider in width than the preceding outline. Following the translation, the video broadcast is redisplayed in an area defined by each successively larger broadcast window outline.

Figure 14 is an exemplary flowchart that illustrates one embodiment of the process for integrating the translation of a display to a small window with other functions of a broadcast system. Operation begins at Block 1402, at which a television screen or display is currently showing a broadcast of a selected station. Operation continues at Block 1404, at which a user may select the electronic program guide for display. The system monitors the states of the buttons on a user's remote control device to determine when the user has depressed a certain button. Implementation of monitoring, e.g., polling, interrupt driven events, are well known in the art and will not be discussed further herein. If the user does not select the

electronic program guide for display operation continues at Block 1402, at which the system continues to display the broadcast and monitors selection by the user of the electronic program guide function. If the user does select the electronic program guide for display at Block 1404, then operation continues at Block 1406, at which a series of successfully smaller broadcast window outlines are displayed.

Operation continues at Block 1408, at which the display of a broadcast is translated to a smaller broadcast window on the display. Operation continues at Block 1410, at which an electronic program guide is displayed in an area adjacent to the smaller broadcast window. An exemplary electronic program guide was previously discussed with reference to **Figure 13**. Operation continues at Block 1412, at which a display information packet is displayed along with the electronic program guide in an area adjacent to the broadcast window on the electronic program guide. The display information packet contains a description of the program that is currently selected. Operation continues at Block 1414, at which a user may select an electronic category guide for display using the buttons on the remote control. If the user selects the display of an electronic category guide, operation continues at Block 1416, at which the display of an electronic category guide replaces the display of the display information packet. The electronic category guide includes a number of programming categories. The broadcast system then identifies programs on channels that correspond to each category contained in the electronic category guide. The programs that correspond to the particular categories of the electronic category guide are then highlighted on the electronic program guide.

If the user does not select the electronic category guide for display, or following the display of the electronic category guide when the user selects the electronic category guide for display, operation continues at Block 1418, at which the user may deselect the display of

the electronic program guide using the buttons on the remote control. If the user does not deselect the electronic program guide at Block 1418, operation continues at Block 1410, at which the broadcast system continues to display the electronic program guide. If the user does deselect the electronic program guide at Block 1418, operation continues at Block 1420, at which a series of successfully larger broadcast window outlines are displayed. Operation continues at Block 1422, at which the electronic program guide is removed from the display. If the electronic category guide was not selected by the user, then the display information packet is also removed from the display at Block 1422. If the electronic category guide was selected by the user, then the electronic category guide is also removed from the display at Block 1422. Operation continues at Block 1424, at which the display of the broadcast is translated to a larger window on the display screen.

As noted earlier and referring again to **Figure 13**, the user may select a display information packet for display along with the electronic program guide. In one embodiment, the display information packet contains a description of the program selected for display. Preferably, the system automatically resizes the text of the display information packet such that all the text appears in the window. **Figure 15** illustrates a display of an electronic program guide in one embodiment of the present invention that is displayed with a display information packet 1502 that contains a greater number of characters than the display information packet 1302 of **Figure 13**. As the area allocated for the display information packet in one embodiment of the broadcasting system is of a constant fixed size, the broadcasting system is configured to adjust the font size of the characters based on the number of characters present for display. Optimization of the font size causes a maximum number of characters to be displayed for a given display area.

Figure 16 is an exemplary flowchart illustrative of the process for optimizing the font size for an available display space in one embodiment of the present invention. Operation begins at Block 1602, at which the broadcast system determines a number of characters to be displayed. Operation continues at Block 1604, at which the broadcast system determines the number of display pixels available for character display. Operation continues at Block 1606, at which the broadcast system adjusts the character font size in order to display all characters in the available number of display pixels. Operation continues at Block 1608, at which the broadcasting system displays the characters in the display information packet.

Figure 17 is an exemplary flowchart illustrative of the process for integrating the process of optimization of the font size in the display information packet with other functions of a broadcast system in one embodiment of the present invention. Operation begins at Block 1702, at which a television screen or display is currently showing a broadcast of a selected station. Operation continues at Block 1704, at which a user may select a display of an electronic program guide. If the user does not select the electronic program guide for display, operation continues at Block 1702, at which the system continues to display the broadcast. If the user does select the display of an electronic program guide operation continues at Block 1706, at which the electronic program guide is displayed. Operation continues at Block 1708, at which a user selects a display information packet for display along with the electronic program guide.

Upon selection of the display information packet for display, operation continues at Block 1710, at which the broadcast system determines the number of pixels available for the display information packet. Operation continues at Block 1712, at which the broadcast system determines the number of characters in the display information packet that are to be displayed. In one embodiment, the maximum number of characters is 256. Operation continues at Block

1714, at which the broadcasting system determines if the number of characters is less than 180. One embodiment of the present invention uses three font sizes for the displaying characters in the display information packet. If the broadcast system determines at Block 1714 that the number of characters is less than 180, then the broadcast system selects the largest of the three font sizes. Following selection of the largest font size, operation continues at Block 1722, at which the broadcast system displays the display information packet using the largest font.

If the broadcast system determines at Block 1714 that the number of characters is not less than 180, then operation continues at Block 1716, at which the broadcasting system determines if the number of characters is greater than 180 and less than 220 characters. If the number of characters is greater than 180 and less than 220 then the broadcast system selects the medium font size. Following selection of the medium font size, operation continues at Block 1722, at which the broadcast system displays the display information packet using the medium sized font.

If the broadcast system determines at Block 1714 that the number of characters is not more than 180 and less than 220, then operation continues at Block 1718, at which the broadcast system determines that the number of characters is more than 220. Operation continues at Block 1720, at which the broadcast system selects the smallest of the three font sizes. Operation continues at Block 1722, at which the broadcast system displays the display information packet using the smallest font size.

Because the number of television broadcasting stations accessible today includes hundreds of stations, many viewers channel surf until they find a channel that has a desirable program. Channel surfing refers to the process of using the channel plus or minus key to sequentially view each channel. While some viewers find channel surfing among hundreds of stations enjoyable, some viewers prefer a

more direct method of program selection. For this reason, an embodiment of the system of the present invention uses two modes, a non-channel surfing mode and a channel surfing mode, from which a user may select channels to view.

The non-channel surfing mode is described with reference to Figures 9A, 9B, and 9C. When the user selects the non-channel surfing mode, the broadcast system is first tuned to a channel 233 to provide a broadcast of a program on the screen or display 910. The user then selects a display of an electronic program guide 912 for identifying the channels available on the broadcast system and the programming available on the channels. A display information packet 916 is displayed along with the electronic program guide 912, and the display information packet 916 contains a description of the program to which the broadcast system is currently tuned. Furthermore, a system pointer 918 is displayed on the electronic program guide 912. The system pointer 918 is used to select a program for viewing by the user and, as such, may be manipulated by the user within the area of the electronic program guide 912. In the non-channel surfing mode the broadcast system is tuned to the channel that is pointed to by the system pointer 918. Furthermore, the display information packet 916 displays a program description for the program to which the broadcasting system is tuned. Therefore, when the user manipulates the system pointer to a different channel 229 and 240 in the non-channel surfing mode, the broadcast system tunes to that channel and displays the program 975 and 930 currently being broadcast on that channel, respectively.

In contrast to the non-channel surfing mode, is the channel surfing mode of one embodiment of the present invention. Figure 18 is an exemplary flowchart illustrative of the process of channel surfing in one embodiment of the present invention. At Block 1802, the broadcast system is tuned to a first channel and a display is generated consisting of a broadcast window, an electronic program guide, a



display information packet, and a system pointer. A first program broadcast is displayed in the broadcast window. Operation continues at Block 1804, at which a display information packet is displayed for the first program broadcast. This display information packet contains a description of the first program broadcast. At Block 1806, the user moves the system pointer to an area of the electronic program guide associated with a second program broadcast. Operation continues at Block 1808, at which the broadcast system replaces the display information packet of the first program with a display information packet of a second program broadcast. The broadcast system remains tuned to the first program broadcast and continues to display the first program broadcast.

In the channel surfing mode the user may manipulate the system pointer to a program or channel in the electronic program guide that is different from the program or channel currently being broadcast. For this reason, it is preferred that the broadcast system provides in the electronic program guide an indication to the user as to the status of the broadcast system tuner and the system pointer. However, the status indication is not required to operate the channel surfing mode in accordance with the teachings of the present invention. **Figure 19** is an exemplary flowchart illustrative of the process for providing tuner and pointer status display in one embodiment of the present invention. An electronic program guide is generated at Block 1902. At Block 1904, a system pointer is supplied for the electronic program guide. Operation continues at Block 1906, at which a status indication is provided of the system tuner and the system pointer.

Each program displayed in the electronic program guide is displayed in a program block or area that is associated with a particular channel and a particular time slot. The status indication is provided by controlling the appearance of the program block in accordance with the location of the system pointer and the channel to which the

system is tuned. In particular, when the broadcast system is tuned to a program, and therefore the broadcast window displays the programming of the channel the system is tuned to, the corresponding program block is displayed on the electronic program guide as appearing to be depressed into the screen. The program blocks of the remaining programs not broadcasted but shown in the electronic program guide appear to be protruding from the screen. Therefore, when the broadcasting system is not tuned to a program the corresponding program block is displayed on the electronic program guide as appearing to be protruding from the screen. The status indication of the system pointer causes a different effect. In particular, when the system pointer is pointing to a program the corresponding program block is displayed as highlighted on the electronic program guide. When the system pointer is not pointing to a program the corresponding program block is displayed as not highlighted on the electronic program guide.

There are four primary combinations of the status indications as used by an embodiment of the broadcast system of the present invention. First, the display of a program block appears depressed into the screen and highlighted to indicate that the broadcast system is tuned to the corresponding program and the system pointer is pointing to the corresponding program. Second, the display of a program block appears depressed into the screen and unhighlighted to indicate that the broadcast system is tuned to the corresponding program while the system pointer is pointing to a different program. Third, the display of a program block appears protruding from the screen and highlighted to indicate that the system pointer is pointing to the corresponding program while the broadcast system is tuned to a different program. Fourth, the display of a program block appears protruding from the screen and unhighlighted to indicate that the broadcast system is not tuned to the corresponding program and the system pointer is not pointing to the corresponding program.

Figure 13 illustrates a tuner and pointer status display in one embodiment of the present invention. The broadcast system of Figure 13 is tuned to the National Geographic Explorer program on the TBS network as indicated by the corresponding program block 1380 appearing to be depressed into the screen. The system pointer is also pointing to the National Geographic Explorer program as indicated by the highlighting of program block 1380.

Figure 20 illustrates the situation in which a broadcast system is tuned to one channel and the system pointer is pointing somewhere other than to the channel which is tuned. In particular, the broadcast system of Figure 20 is tuned to the National Geographic Explorer program on the TBS network as indicated by the corresponding program block 2002 appearing to be depressed into the screen. An electronic category guide is selected for display instead of a display information packet. The system pointer is pointing to the "ALL" category box 2004 in the electronic category guide as indicated by the highlighting of the category block 2004.

As shown in Figure 20, instead of selecting a display information packet for display at Block 1806 of Figure 18, the user may select an electronic category guide 2006 for display with the electronic program guide 2001. The electronic category guide 2006 includes a number of programming categories 2010. The broadcast system then identifies programs on channels that correspond to each category 2010 contained in the electronic category guide 2006. The programs that correspond to the particular categories of the electronic category guide 2006 are then indicated or highlighted on the electronic program guide 2001. The system pointer may be manipulated by the user to an area of the electronic category guide 2006, and system pointer status is indicated. When the system pointer is pointing to a category block the category block is displayed as highlighted on the electronic category guide 2006. The system pointer is pointing to the "ALL" category block

2004 in the electronic category guide 2006 as indicated by the highlighting of category block 2004.

If the user, typically using the broadcast system remote control, selects one of the categories from the electronic category guide, then the display of the electronic category guide is replaced with a display of an electronic subcategory guide. **Figure 21** illustrates the display of an electronic subcategory guide 2102 with an electronic program guide 2104 in one embodiment of the present invention. The selected category 2106 is displayed along with the electronic subcategory guide 2102 and the electronic program guide 2104. The electronic subcategory guide 2102 includes a number of subcategories 2108. The broadcast system identifies programs on channels that correspond to each subcategory contained in the electronic subcategory guide 2102. The programs that correspond to the particular categories of the electronic subcategory guide 2102 are indicated or highlighted on the electronic program guide. The status of the system pointer is shown and changed as the pointer is moved about the display. For example, the system pointer may be manipulated by the user to an area of the electronic subcategory guide 2102. When the system pointer is pointing to a subcategory block the subcategory block is displayed as highlighted on the electronic category guide. In **Figure 21**, the system pointer is pointing to the "ALL" subcategory block 2108 in the electronic subcategory guide 2102 as indicated by the highlighting of subcategory block 2108.

The multiple channel broadcasting system of one embodiment of the present invention provides a user with several options regarding the programs available for broadcast. The multiple channel broadcasting system allows the user to select pay-per-view broadcasts for purchase. In addition, the broadcast system allows the user to select corresponding programs for recording. Furthermore, the multiple channel broadcasting system allows the user to set a broadcasting system timer to automatically tune the broadcasting

system to a program at a particular time. Moreover, the multiple channel broadcasting system allows the user to designate certain programs as favorite programs. Consequently, the multiple channel broadcasting system of one embodiment of the present invention displays icons that provide the user with the status of the programs while viewing the electronic program guide.

**Figure 22** is an exemplary flowchart that illustrates the process for providing an icon to indicate program status in one embodiment of the present invention. Operation begins at Block 2202, at which the broadcasting system is tuned to display a program broadcast. Operation continues at Block 2204, at which an electronic program guide is generated. Electronic menus may be displayed along with the electronic program guide. The electronic menus control pay-per-view purchases, selections of programs for recording, setting of the broadcasting system timer, and selection of favorite programs. At Block 2206, graphic images are generated that indicate program status. Operation continues at Block 2208, at which the graphic images are displayed within the electronic program guide. The icons or graphic images may serve as electronic links between the electronic program guide and a corresponding menu of the electronic menus and a display information packet.

**Figure 23** illustrates the display of an electronic program guide having program status icons in one embodiment of the present invention. The icon 2302 displayed in program block 2304 to indicate that a pay-per-view broadcast is selected resembles a dollar sign. The icon 2306 displayed in program block 2308 to indicate that a broadcast is selected for recording resembles a videocassette tape. The icon 2310 displayed in program block 2312 to indicate that the broadcast system timer is set to tune the broadcast system to a program at the time of the corresponding program resembles a clock. An icon may be displayed in a program block to indicate that a program is a favorite

program. Icon 2314 in program block 2316 is one possible representation of a favorite program icon.

The multiple channel broadcasting system of one embodiment of the present invention provides a display of the time wherein a user can view the current time in relation to the times of programming and the program blocks. **Figure 24** is an exemplary flowchart that illustrates a process for providing a time bar with the current time marker in one embodiment of the present invention. Operation begins at Block 2402, at which a television screen or display is currently showing a broadcast of a selected station. Operation continues at Block 2404, at which a user may select a display of an electronic program guide. If the user does not select display of an electronic program guide operation continues at Block 2402, at which the broadcasting system continues to display the broadcast of the currently selected station. If the user selects the display of an electronic program guide, operation continues at Block 2406, at which the electronic program guide is displayed by the broadcast system.

Following display of the electronic program guide, operation continues at Block 2408, at which a time bar is displayed that identifies times of programming on the channels in the broadcasting system. Operation continues at Block 2410, at which a graphical representation of the current time is generated. Operation continues at Block 2412, at which the graphical representation of the current time is displayed in proximity to the time bar so as to indicate the current time in relation to the times of programming on the channels of the broadcast system. In one embodiment of the present invention the graphical representation of time is displayed as an inverted triangle on the time bar. The graphical representation of time may include a digital display of the current time. The graphical representation of time may also include an icon with the display of the current time.

**Figure 25** illustrates the display of an electronic program guide and a graphical representation of the current time in relation to the

times of channel programming in one embodiment of the present invention. When the user selects the display of an electronic program guide, the electronic program guide 2502 is displayed by the broadcast system. With the electronic program guide, a time bar 2504 is displayed that identifies times of programming 2506 on the channels in the broadcasting system. An embodiment of the present invention generates a graphical representation of the current time 2508. This graphical representation of the current time 2508 is displayed in proximity to the time bar 2504 so as to indicate the current time in relation to the times of programming on the channels of the broadcast system. This graphical representation of the current time 2508 is displayed as an inverted triangle on the time bar and includes a digital display of the current time.

In addition to the electronic program guide discussed herein, an embodiment of the multiple broadcasting system of the present invention provides an on screen menu display that enables the user to operate different functions of the system. **Figure 26** is an exemplary flowchart that illustrates the process for providing an on screen menu having differing transparency levels in one embodiment of the present invention.

In **Figure 26**, operation begins at Block 2602, at which an electronic menu display is generated. The menu display comprises multiple components, multiple alphanumeric characters, and multiple icons that identify different functions of the broadcast system. Operation continues at Block 2604, at which different levels of transparency are applied to the different electronic menu components. The different levels of transparency are applied to the components so that the number of opaque components is minimized and the background is highly transparent. Operation continues at Block 2606, at which the electronic menu is superimposed over the display of a program broadcast. While the opaque components are minimized, the obstruction of the video of the broadcast by the electronic menu

display is minimized. Preferably, the different transparency levels may be selected by the user.

When the user selects an electronic menu for display, then alphanumeric characters and icons are generated that identify different broadcast system functions. The user may select the transparency levels to be applied to the characters and icons of the electronic menu display. If the user does not select the transparency levels to be applied to the characters and icons of the electronic menu, then the multiple channel broadcasting system applies the least transparent level of transparency to the electronic menu icons. Furthermore, the multiple channel broadcasting system applies the least transparent level of transparency to the verbal description of the broadcasting system functions. Moreover, the multiple channel broadcasting system applies the most transparent level of transparency to the numerals of the electronic menu display.

Figure 27 illustrates the display of an on screen menu having differing transparency levels in one embodiment of the present invention. The electronic menu display 2702 comprises multiple components 2711-2719, multiple alphanumeric characters 2720-2722, and multiple icons 2731-2739 that identify different functions of the broadcast system. Different levels of transparency are applied to the different electronic menu components. The different levels of transparency are applied to the components so that the number of opaque components is minimized and the background is highly transparent. Following generation of the electronic menu 2702, the electronic menu 2702 is superimposed over a program broadcast 2750.

The invention has been described in conjunction with the preferred embodiment. Although the present invention has been described with reference to specific exemplary embodiments, it will be evident that various modifications and changes may be made to these embodiments without departing from the broader spirit and scope of the invention as set forth in the claims. Accordingly, the specification



31

and drawings are to be regarded in an illustrative rather than a restrictive sense.

CLAIMS

What is claimed is:

1. In a multiple channel broadcasting system in which programs are broadcasted for display on a screen, a method for generating an on-screen guide for a user to select channels to view, comprising the steps of:

tuning to a channel to provide a display of a broadcast of a first program on the screen;

displaying an electronic program guide identifying channels and programming in the broadcasting system;

translating the display of a broadcast of the first program to a smaller broadcast window on the screen, said step of translating comprising the steps of superimposing at least one of a series of successively smaller broadcast window outlines over the display of the broadcast on the screen and displaying the broadcast in the smaller broadcast window; and

displaying the electronic program guide along with the broadcast on the screen, such that no portion of the broadcast is covered by the electronic program guide.

2. The method as set forth in claim 1, wherein a display information packet containing a description of the program is displayed with the electronic program guide.

3. The method as set forth in claim 2, wherein an electronic category guide is displayed with the electronic program guide.

4. The method as set forth in claim 1, further comprising the steps of:  
displaying a first display information packet containing a description of said first program;  
displaying a system pointer;

manipulating said system pointer in response to input by said user to an area of the electronic program guide associated with a second program; and

replacing the display of the first display information packet with a display of a second display information packet containing a description of the second program.

5. The method as set forth in claim 4, further comprising the steps of:  
indicating selection of a channel pointed by the pointer;  
tuning said broadcast system to said channel if said channel is different from said first channel; and  
removing the electronic program guide and display information packet in response to selection of a channel.

6. The method as set forth in claim 4, further comprising a method for generating an on-screen guide in a second mode for a user to select channels to view, comprising the steps of:

tuning to a first channel to provide a broadcast of a first program on the screen;

displaying an electronic program guide identifying a plurality of channels and programming on the channels;

displaying a first display information packet containing a description of said first program;

displaying a system pointer;

manipulating said system pointer in response to input by said user to an area of the electronic program guide associated with a second program; and

tuning said broadcasting system to said second program and displaying a second display information packet containing a description of said second program.

7. The method as set forth in claim 1, further comprising the steps of:  
displaying a status indication on said electronic program guide that indicates to said user a status of said broadcasting system tuner;

displaying a status indication on said electronic program guide that indicates to said user a status of said system pointer.

8. The method set forth in claim 7, wherein said step of displaying said status indication of said broadcasting system tuner comprises the steps of:

displaying said channel program on said electronic program guide as appearing to be depressed into said screen when said broadcasting system is tuned to said channel program;

displaying said channel program on said electronic program guide as appearing to be protruding from said screen when said broadcasting system is not tuned to said channel program.

9. The method as set forth in claim 7, wherein said step of displaying said status indication of said system pointer comprises the steps of:

displaying said channel program on said electronic program guide as highlighted when said pointer is pointing to said channel program;

displaying said channel program on said electronic program guide as unhighlighted when said pointer is not pointing to said channel program.

10. The method as set forth in claim 1, further comprising the steps of:

displaying an electronic category guide; and

displaying a system pointer that can be manipulated in response to input by said user to an area of the electronic category guide.

11. The method as set forth in claim 10, wherein the user selects one of the plurality of categories, the selection displaying an electronic subcategory guide comprising the steps of:

displaying said selected category;

displaying a subcategory guide identifying a plurality of subcategories;

identifying programs on channels that correspond to each subcategory of said plurality of subcategories;

highlighting those programs on said program guide that are identified to be the selected subcategory;

wherein all programming can be viewed and the selected subcategory of programs is highlighted for easy viewing by the user.

12. A system comprising:

a processor configured to be coupled to a display device, said processor,

configured to control the system to tune to a first channel in a multiple channel broadcasting system to provide a broadcast of a first program on the display device;

configured to control the system to generate an electronic program guide identifying channels and programming of channels in the broadcasting system;

configured to control the system to translate the display of the broadcast of the first program to a smaller broadcast window on the display device, said translation superimposing at least one of a series of successively smaller broadcast window outlines over the display of the broadcast on the display device; and

configured to control the system to display the electronic program guide along with the broadcast on the display device, such that no portion of the broadcast is covered by the electronic program guide.

13. The system as set forth in claim 12, wherein the processor is further configured to control the system to generate a display information packet containing a description of said first program.

14. The system as set forth in claim 12, wherein the processor is further configured to control the system to generate an electronic category guide containing a plurality of programming categories.

15. The system as set forth in claim 12, wherein the processor is further configured to:

- control the system to display a first display information packet containing a description of said first program;

- configured to control the system to display a system pointer;

- configured to control the system to manipulate said system pointer in response to input by said user to an area of the electronic program guide associated with a second program; and

- configured to control the system to replace the display of the first display information packet with a display of a second information packet containing a description of the second program.

16. The system as set forth in claim 15, wherein the processor is further configured to generate an on-screen guide in a second mode for a user to select channels to view said processor configured to:

- control the system to display a first display information packet containing a description of said first program;

- configured to control the system to display a system pointer;

- configured to control the system to manipulate said system pointer in response to input by said user to an area of the electronic program guide associated with a second program; and

- configured to control the system to tune said broadcasting system to said second program and displaying a second display information packet containing a description of said second program.

17. The system as set forth in claim 15, wherein the processor is further configured to:

- control the system to display a first status indication on said electronic program guide that indicates to said user a status of said broadcasting system tuner;

- display a second status indication on said electronic program guide that indicates to said user a status of said system pointer.

18. The system as set forth in claim 12, wherein the processor is further configured to:
- control the system to display an electronic category guide; and
  - configured to control the system to display a system pointer that can be manipulated in response to input by said user to an area of the electronic category guide.
19. The system as set forth in claim 12, wherein said user selects one of a plurality of categories, the processor further configured to display electronic subcategory guide in response to the selection by:
- displaying said selected category;
  - displaying a subcategory guide identifying a plurality of subcategories;
  - identifying programs on channels that correspond to each subcategory of said plurality of subcategories;
  - highlighting those programs on said program guide that are identified to be the selected subcategory;
  - wherein all programming can be viewed and the selected subcategory of programs is highlighted for easy viewing by the user.
20. A system for generating an on-screen guide, comprising:
- an electronic program guide displaying on a display device, said electronic program guide configured to operate in a first mode to identify channels and programming in a multiple channel broadcasting system;
  - a broadcast of a first program displayed on the display device;
  - and
  - a controller that translates the broadcast from a first size to a smaller second size when the electronic program guide is displayed by superimposing at least one of a series of successively smaller broadcast window outlines over the display of the broadcast on the screen.
21. The system as set forth in claim 20, further comprising a display information packet containing a description of the first program, the

display information packet displayed along with the electronic program guide.

22. The system as set forth in claim 21, wherein said display information packet is selectively replaced by an electronic category guide containing a plurality of programming categories.

23. The system as set forth in claim 20, further comprising:

- a display information packet configured to contain a description of said first program;

- a system pointer configured to be manipulated in response to input by said user to point to an area associated with a second program in said electronic program guide, said controller further configured to, in response to said manipulation of said pointer, keep said broadcasting system tuned to said first channel thereby allowing said user to view the contents of said area associated with said second program while viewing said broadcast of said first program on said screen.

24. The system as set forth in claim 23, further comprising an electronic category guide, comprising:

- a plurality of categories;

- an identification of programs on channels that correspond to each category of said plurality of categories;

- a highlighting of said programs on said program guide that are identified to be the selected category.

25. The system as set forth in claim 23, further comprising a second mode in which said controller causes the system to tune to said second program and display said second display information packet when the system pointer is manipulated to point to the area associated with the second program.

26. The system as set forth in claim 23, further comprising:



a first status indication displayed on said electronic program guide that indicates to said user a status of said broadcasting system tuner;

a second status indication displayed on said electronic program guide that indicates to said user a status of said system pointer.

27. A computer readable medium containing executable instructions which, when executed in a processing system, causes the system to perform the steps for generating an on-screen guide for a user to select channels in a multiple channel broadcasting system comprising:

tuning to a channel to provide a display of a broadcast of a first program on a display;

generating an electronic program guide identifying channels and programming in the broadcasting system;

translating the display of the broadcast of the first program to a smaller broadcast window on the screen, said step of translating comprising the steps of superimposing at least one of a series of successively smaller broadcast window outlines over the display of the broadcast on the screen and displaying the broadcast in the smaller broadcast window; and

displaying the electronic program guide along with the broadcast on the screen, such that no portion of the broadcast is covered by the electronic program guide.

28. The computer readable medium as set forth in claim 27, further comprising instructions, which when executed, performing the steps of:

displaying a system pointer;

manipulating said system pointer in response to input by said user to an area of the electronic program guide associated with a second program; and

replacing the display of the first display information packet with a display of a second display information packet containing a description of the second program.

29. The computer readable medium as set forth in claim 28, said instructions, when executed, further performing the steps of:
- indicating selection of a channel pointed by the pointer;
  - tuning said broadcast system to said channel if said channel is different from said first channel; and
  - removing the electronic program guide and display information packet in response to selection of a channel.
30. The computer readable medium as set forth in claim 29, further comprising instructions for generating an on-screen guide in a second mode for a user to select channels to view, said instructions, when executed, performing the steps of:
- manipulating said system pointer in response to input by said user to an area of the electronic program guide associated with a second program; and
  - tuning said broadcasting system to said second program and displaying the second display information packet containing a description of said second program.
31. The computer readable medium as set forth in claim 27, said further comprising instruction, which when executed, performing the steps of:
- displaying an electronic category guide; and
  - displaying a system pointer that can be manipulated in response to input by said user to an area of the electronic category guide.
32. The computer readable medium as set forth in claim 31, wherein the instructions for displaying the electronic category guide, when executed, perform the steps of:
- displaying a category guide identifying a plurality of categories;
  - identifying programs on channels that correspond to each category of said plurality of categories;
  - highlighting those programs on said program guide that are identified to be the selected category;

wherein all programming can be viewed and the selected category of programs is highlighted for easy viewing by the user.

33. The computer readable medium as set forth in claim 32, further comprising instructions, which when executed, and in response to user selection of one of the plurality of categories, performs the steps of:

- displaying said selected category;
- displaying a subcategory guide identifying a plurality of subcategories;
- identifying programs on channels that correspond to each subcategory of said plurality of subcategories;
- highlighting those programs on said program guide that are identified to be the selected subcategory;
- wherein all programming can be viewed and the selected subcategory of programs is highlighted for easy viewing by the user.

34. The computer readable medium as set forth in claim 27, further comprising instructions, which when executed, perform the steps of:

- supplying a system pointer which points to a location in said electronic program guide, said location identifying a channel program in the broadcasting system; and

- providing an indication to said user as to the status of the broadcasting system tuner and said system pointer comprising the steps of;

- displaying said channel program on said electronic program guide as appearing to be depressed into said screen when said broadcasting system is tuned to said channel program,

- displaying said channel program on said electronic program guide as appearing to be protruding from said screen when said broadcasting system is not tuned to said channel program,

displaying said channel program as highlighted when said pointer is pointing to said channel program, and displaying said channel program as unhighlighted when said pointer is not pointing to said channel program.

35. In a multiple channel broadcasting system which displays a first window containing a broadcast of a program and a second window containing programming information, a method for removing the programming information from a display, comprising the steps of:

translating the broadcast of a program displayed in the first window to a larger window on the display by superimposing at least one of a series of successively larger video window outlines over the screen;

removing the display of said programming information from said display;

displaying said video of a broadcast in the area of the largest video window outline.

36. A system comprising:

a processor configured to be coupled to a display device, said processor,

configured to control the system to tune to a channel in a multiple channel broadcasting system to provide a broadcast of a program on said display device in a first window on the display;

configured to control the system to generate programming information identifying channels in the broadcasting system;

configured to control the system to translate video of the broadcast of a program to a smaller broadcast window on the display device, said translation superimposing at least one of a series of successively smaller broadcast window outlines over the broadcast on the display device;

configured to control the system to display the programming information along with the translated broadcast on the display device.

37. The system as set forth in claim 29, wherein the programming information is removed from the display device, said processor, configured to control the system to translate video of a broadcast of a program displayed in the smaller broadcast window to a larger broadcast window on the display device by superimposing at least one of a series of successively larger broadcast window outlines over the display device;

configured to control the system to remove the display of the programming information from said display device;

configured to control the system to display the video of the broadcast in the area of the largest broadcast window outline.

38. In a multiple channel broadcasting system in which programs are broadcasted for display on a screen, a method for generating an on-screen guide in a first mode for a user to select channels to view, comprising the steps of:

tuning to a first channel to provide a broadcast of a first program on the screen;

displaying an electronic program guide identifying a plurality of channels and programming on the channels;

displaying a first display information packet containing a description of said first program;

displaying a system pointer;

manipulating said system pointer in response to input by said user to an area of the electronic program guide associated with a second program; and

replacing the display of the first display information packet with a display of a second display information packet containing a description of the second program.

39. The method as set forth in claim 38, further comprising the steps of:

- indicating selection of a channel pointed by the pointer;
- tuning said broadcast system to said channel if said channel is different from said first channel; and
- removing the electronic program guide and display information packet in response to selection of a channel.

40. The method as set forth in claim 38, further comprising a method for generating an on-screen guide in a second mode for a user to select channels to view, comprising the steps of:

- tuning to a first channel to provide a broadcast of a first program on the screen;
- displaying an electronic program guide identifying a plurality of channels and programming on the channels;
- displaying a first display information packet containing a description of said first program;
- displaying a system pointer;
- manipulating said system pointer in response to input by said user to an area of the electronic program guide associated with a second program; and
- tuning said broadcasting system to said second program and displaying a second display information packet containing a description of said second program.

41. The method as set forth in claim 38, further comprising the steps of:

- displaying a status indication on said electronic program guide that indicates to said user a status of said broadcasting system tuner;
- displaying a status indication on said electronic program guide that indicates to said user a status of said system pointer.

42. The method as set forth in claim 41, wherein said step of displaying said status indication of said broadcasting system tuner comprises the steps of:

displaying said channel program on said electronic program guide as appearing to be depressed into said screen when said broadcasting system is tuned to said channel program;

displaying said channel program on said electronic program guide as appearing to be protruding from said screen when said broadcasting system is not tuned to said channel program.

43. The method as set forth in claim 41, wherein said step of displaying said status indication of said system pointer comprises the steps of:

displaying said channel program on said electronic program guide as highlighted when said pointer is pointing to said channel program;

displaying said channel program on said electronic program guide as unhighlighted when said pointer is not pointing to said channel program.

44. In a multiple channel broadcasting system in which programs are broadcasted for display on a screen, a method for generating an on-screen guide for a user to select channels to view, comprising the steps of:

tuning to a first channel to provide a broadcast of a first program on the screen;

displaying an electronic program guide identifying a plurality of channels and programming on the channels;

displaying an electronic category guide; and

displaying a system pointer that can be manipulated in response to input by said user to an area of the electronic category guide.

45. The method as set forth in claim 44, wherein said step of displaying said electronic category guide comprises the steps of:

displaying a category guide identifying a plurality of categories;  
identifying programs on channels that correspond to each  
category of said plurality of categories;

highlighting those programs on said program guide that are  
identified to be the selected category;

wherein all programming can be viewed and the selected  
category of programs is highlighted for easy viewing by the user.

46. The method as set forth in claim 44, further comprising the steps  
of:

displaying a status indication of said electronic program guide  
that indicates to said user a status of said broadcasting system tuner;

displaying a status indication on said electronic program guide  
that indicates to said user a status of said system pointer, displaying a  
status indication on said electronic category guide that indicates to said  
user a status of said system pointer, said status indication causing one  
of a plurality of categories on said electronic category guide to be  
displayed as highlighted when said pointer is pointing to said category.

47. The method as set forth in claim 44, further comprising the steps  
of displaying an electronic subcategory guide in response to user  
selection of one of said plurality of categories, comprising the steps of:

displaying said selected category;

displaying a subcategory guide identifying a plurality of  
subcategories;

identifying programs on channels that correspond to each  
subcategory of said plurality of subcategories;

highlighting those programs on said program guide that are  
identified to be the selected subcategory;

wherein all programming can be viewed and the selected  
subcategory of programs is highlighted for easy viewing by the user.

48. A computer system comprising:



47

a processor configured to be coupled to a display device, said processor,

configured to control the system to tune to a first channel to provide a broadcast of a first program on the screen;

configured to control the system to display an electronic program guide identifying a plurality of channels and programming on the channels;

configured to control the system to display a first display information packet containing a description of said first program;

configured to control the system to display a system pointer;

configured to control the system to manipulate said system pointer in response to input by said user to an area of the electronic program guide associated with a second program; and

configured to control the system to replace the display of the first display information packet with a display of a second information packet containing a description of the second program.

49. The computer system as set forth in claim 48, wherein said processor generates an on-screen guide in a second mode for a user to select channels to view, said processor:

configured to control the system to tune to a first channel to provide a broadcast of a first program on the screen;

configured to control the system to display an electronic program guide identifying a plurality of channels and programming on the channels;

configured to control the system to display a first display information packet containing a description of said first program;

configured to control the system to display a system pointer;

configured to control the system to manipulate said system pointer in response to input by said user to an area of the electronic program guide associated with a second program; and

configured to control the system to tune said broadcasting system to said second program and displaying a second display information packet containing a description of said second program.

50. A computer system comprising:  
a display device;  
a processor coupled to said display device, said processor,  
configured to control the system to tune to a first channel  
to provide a broadcast of a first program on the screen;  
configured to control the system to display an electronic  
program guide identifying a plurality of channels and programming  
on the channels;  
configured to control the system to display an electronic  
category guide; and  
configured to control the system to display a system  
pointer that can be manipulated in response to input by said user to an  
area of the electronic category guide.
51. The computer system as set forth in claim 50, wherein said display  
of said electronic subcategory guide comprises:  
displaying said selected category;  
displaying a subcategory guide identifying a plurality of  
subcategories;  
identifying programs on channels that correspond to each  
subcategory of said plurality of subcategories;  
highlighting those programs on said program guide that are  
identified to be the selected subcategory;  
wherein all programming can be viewed and the selected  
subcategory of programs is highlighted for easy viewing by the user.
52. A system for generating an on-screen guide in a first mode for a  
user to select channels to view, comprising:  
a multiple channel broadcasting system configured to be tuned  
to a first channel to provide a broadcast of a first program on a screen;  
an electronic program guide configured to operate in a first  
mode to identify a plurality of channels and programming on the  
channels in the broadcasting system;

a display information packet configured to contain a description of said first program;

a system pointer configured to be manipulated in response to input by said user to point to an area associated with a second program in said electronic program guide; and

a controller configured to, in response to said manipulation of said pointer, keep said broadcasting system tuned to said first channel thereby allowing said user to view the contents of said area associated with said second program while viewing said broadcast of said first program on said screen.

53. The system as set forth in claim 52, further comprising the first status indication indicates the status of said broadcasting system tuner by:

displaying said channel program on said electronic program guide as appearing to be depressed into said screen when said broadcasting system is tuned to said channel program;

displaying said channel program on said electronic program guide as appearing to be protruding from said screen when said broadcasting system is not tuned to said channel program; and

a first status indication displayed on said electronic program guide that indicates to said user a status of said broadcasting system tuner;

a second status indication displayed on said electronic program guide that indicates to said user a status of said system pointer, the second status indication indicates the status of said system pointer by:

displaying said channel program on said electronic program guide as highlighted when said pointer is pointing to said channel program;

displaying said channel program on said electronic program guide as unhighlighted when said pointer is not pointing to said channel program.

54. A computer readable medium containing executable instructions which, when executed in a processing system, causes the system to perform the steps for generating an on-screen guide in a first mode for a user to select channels to view in a multiple channel broadcasting system comprising:

- tuning to a first channel to provide a broadcast of a first program on the screen;

- displaying an electronic program guide identifying a plurality of channels and programming on the channels;

- displaying a first display information packet containing a description of said first program;

- displaying a system pointer;

- manipulating said system pointer in response to input by said user to an area of the electronic program guide associated with a second program; and

- replacing the display of the first display information packet with a display of a second display information packet containing a description of the second program.

55. The computer readable medium as set forth in claim 54, wherein generating an on-screen guide in a second mode for a user to select channels to view comprises the steps of:

- tuning to the first channel to provide the broadcast of a first program on the screen;

- displaying the electronic program guide identifying a plurality of channels and programming on the channels;

- displaying the first display information packet containing the description of said first program;

- displaying the system pointer;

- manipulating said system pointer in response to input by said user to an area of the electronic program guide associated with the second program; and

tuning said broadcasting system to said second program and displaying the second display information packet containing a description of said second program.

56. A computer readable medium containing executable instructions which, when executed in a processing system, causes the system to perform the steps for generating an on-screen guide in a first mode for a user to select channels to view in a multiple channel broadcasting system comprising:

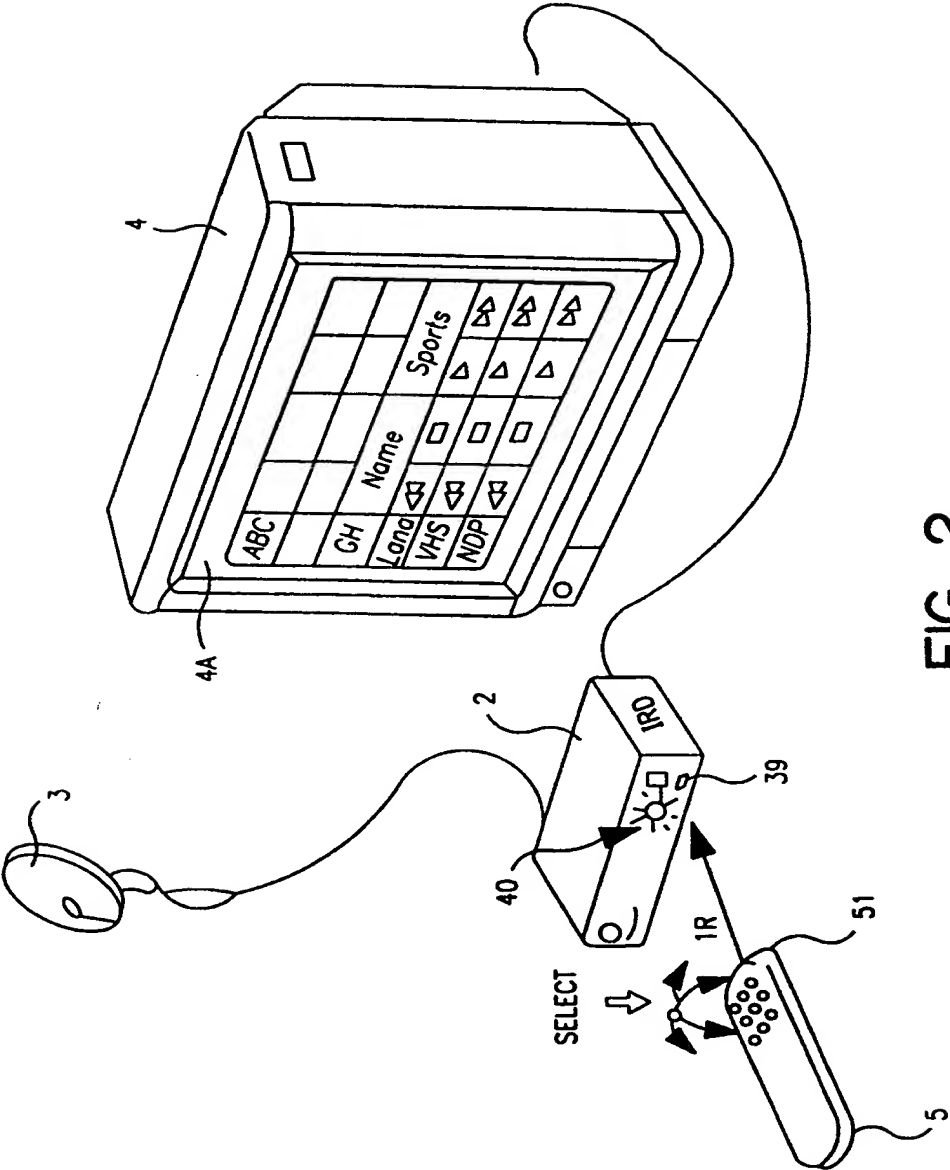
- tuning to a first channel to provide a broadcast of a first program on the screen;
- displaying an electronic program guide identifying a plurality of channels and programming on the channels;
- displaying an electronic category guide; and
- displaying a system pointer that can be manipulated in response to input by said user to an area of the electronic category guide.

57. The computer readable medium as set forth in claim 56, wherein said instruction to display said electronic subcategory guide comprises:

- displaying said selected category;
- displaying a subcategory guide identifying a plurality of subcategories;
- identifying programs on channels that correspond to each subcategory of said plurality of subcategories;
- highlighting those programs on said program guide that are identified to be the selected subcategory;
- wherein all programming can be viewed and the selected subcategory of programs is highlighted for easy viewing by the user.

Movies Guide		Thurs 12/16/94 1:54PM			
		12:30PM	1:00PM	1:30PM	2:00PM
OTV 149	Seduce Me: Pamela Principle 2	Seduce Me: Pamela Pr...			
MTV 150	Top Rap Videos	Music of the 70s			
C TV 151	Cooking with Linus	Comedy Club			
OTV 154	The Ref	The Ref			
OTV 155	Star Trek	The Chase			
STV 156	Wildlife Safari	Ancient Civilizations			
		Themes	Sports	Other	All
		Exit			

**FIG. 1**  
PRIOR ART



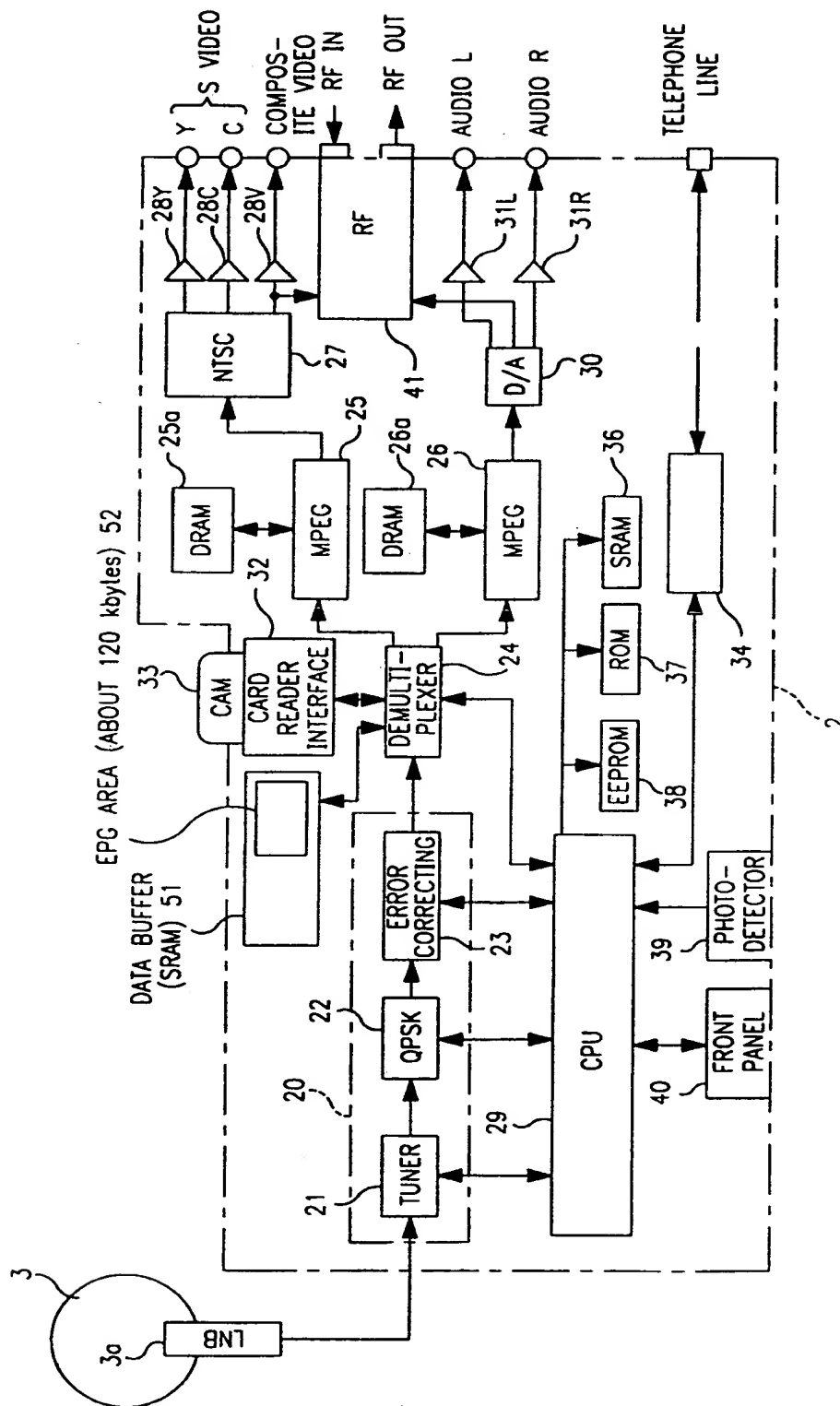


FIG. 3



4 / 26

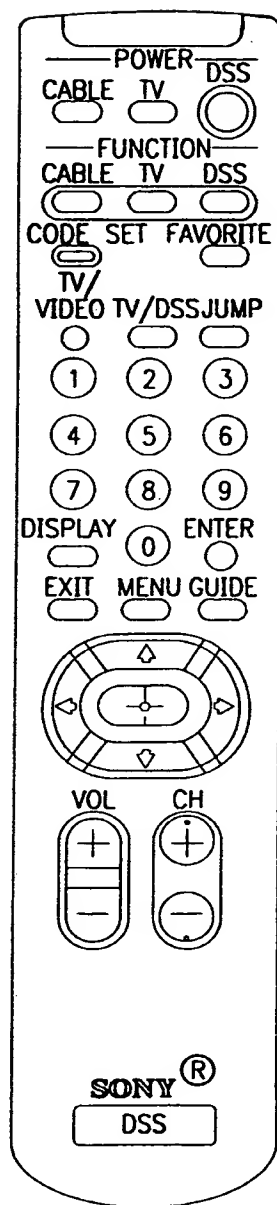


FIG. 4

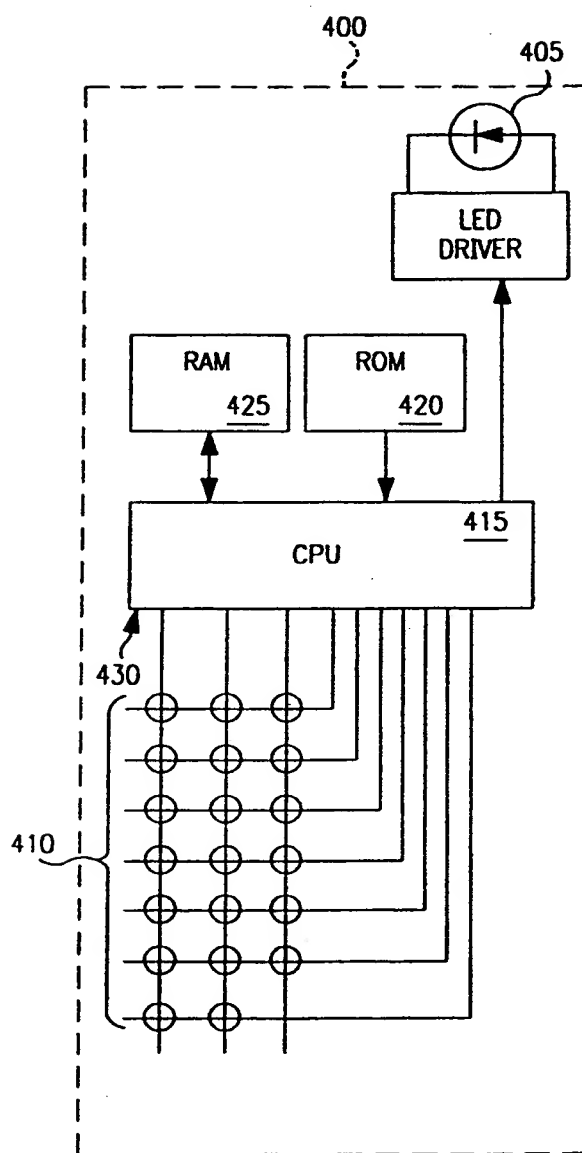


FIG. 5

6 / 26

## DATA OF PROGRAM GUIDE

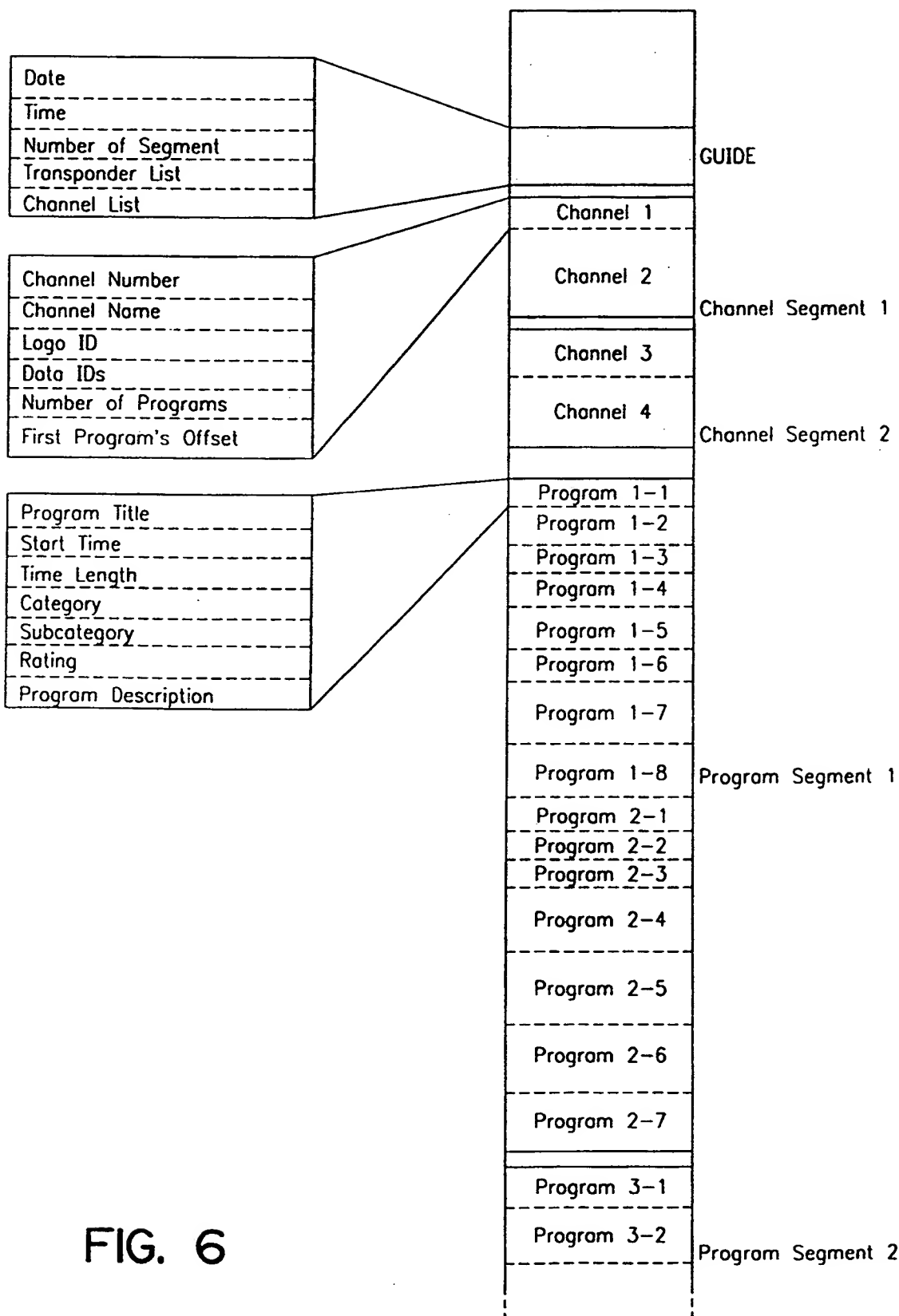


FIG. 6

7 / 26

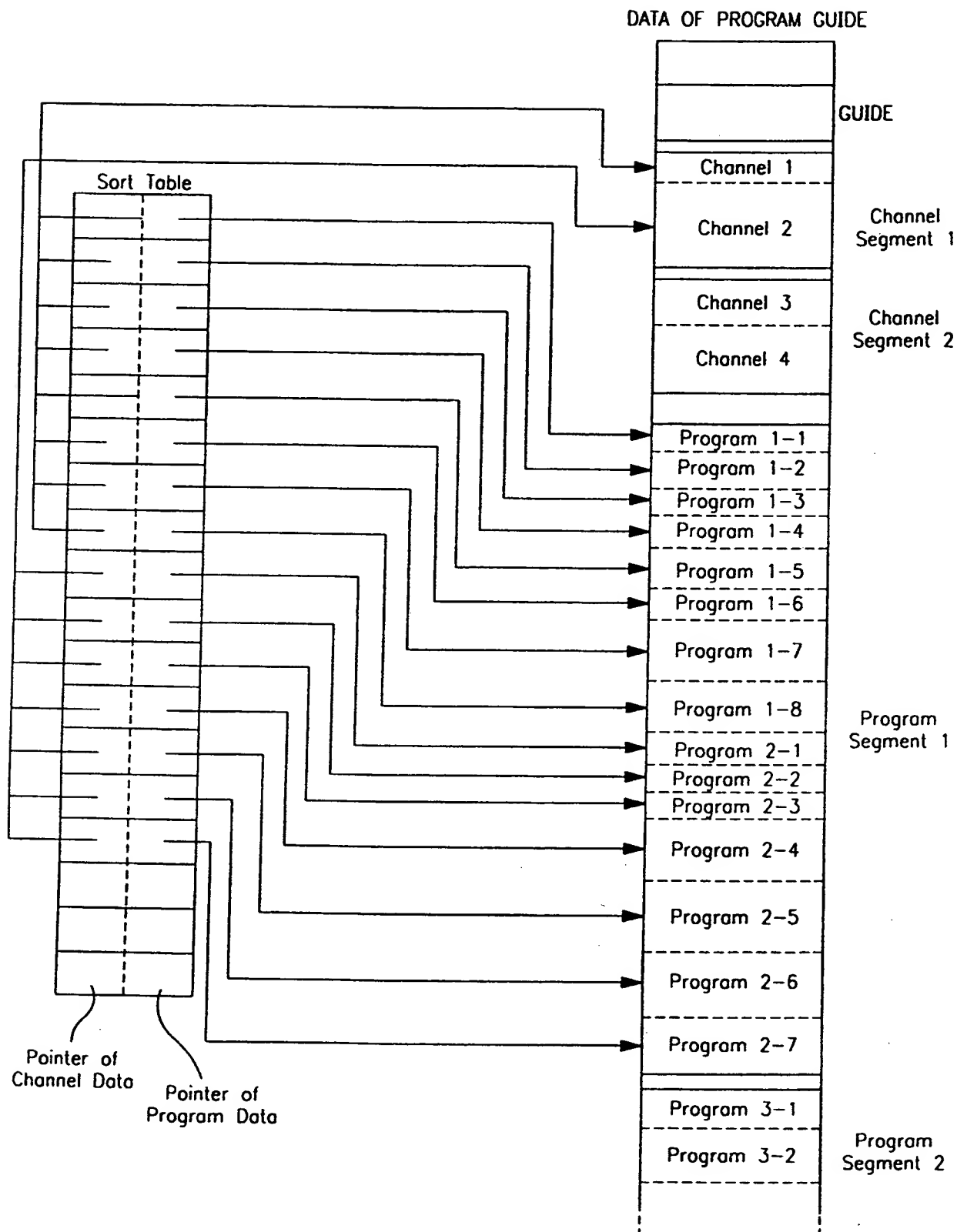
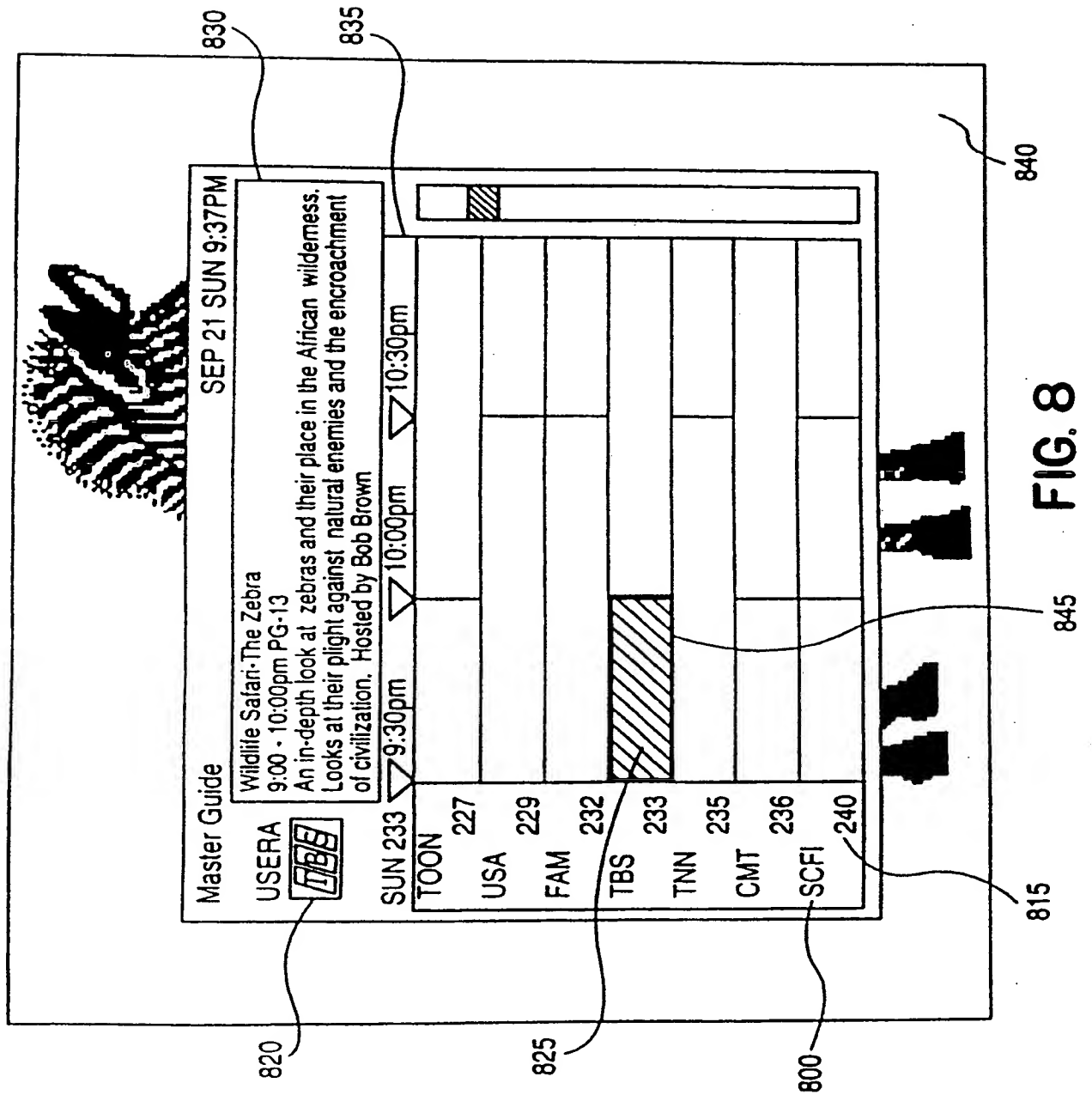


FIG. 7



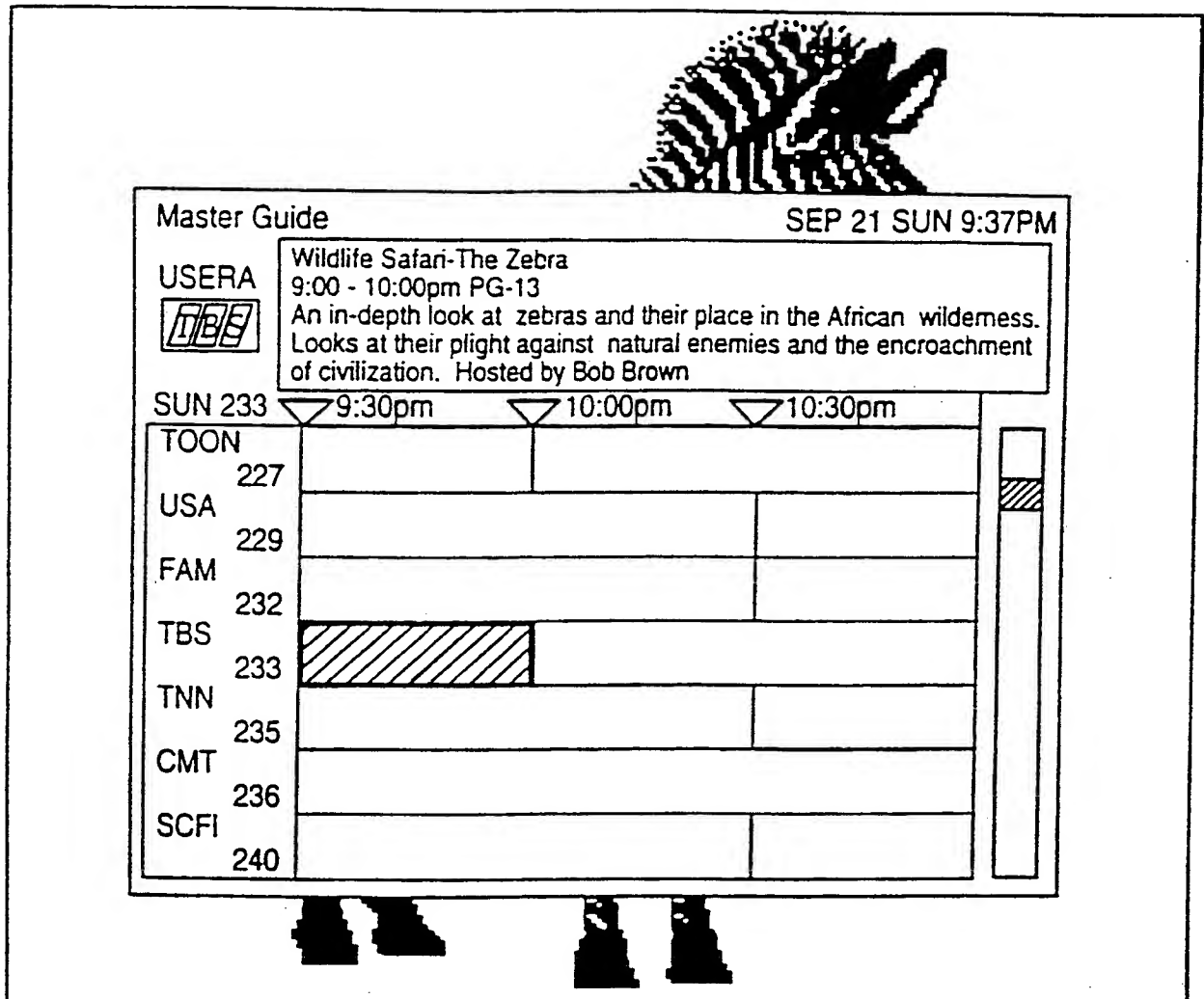
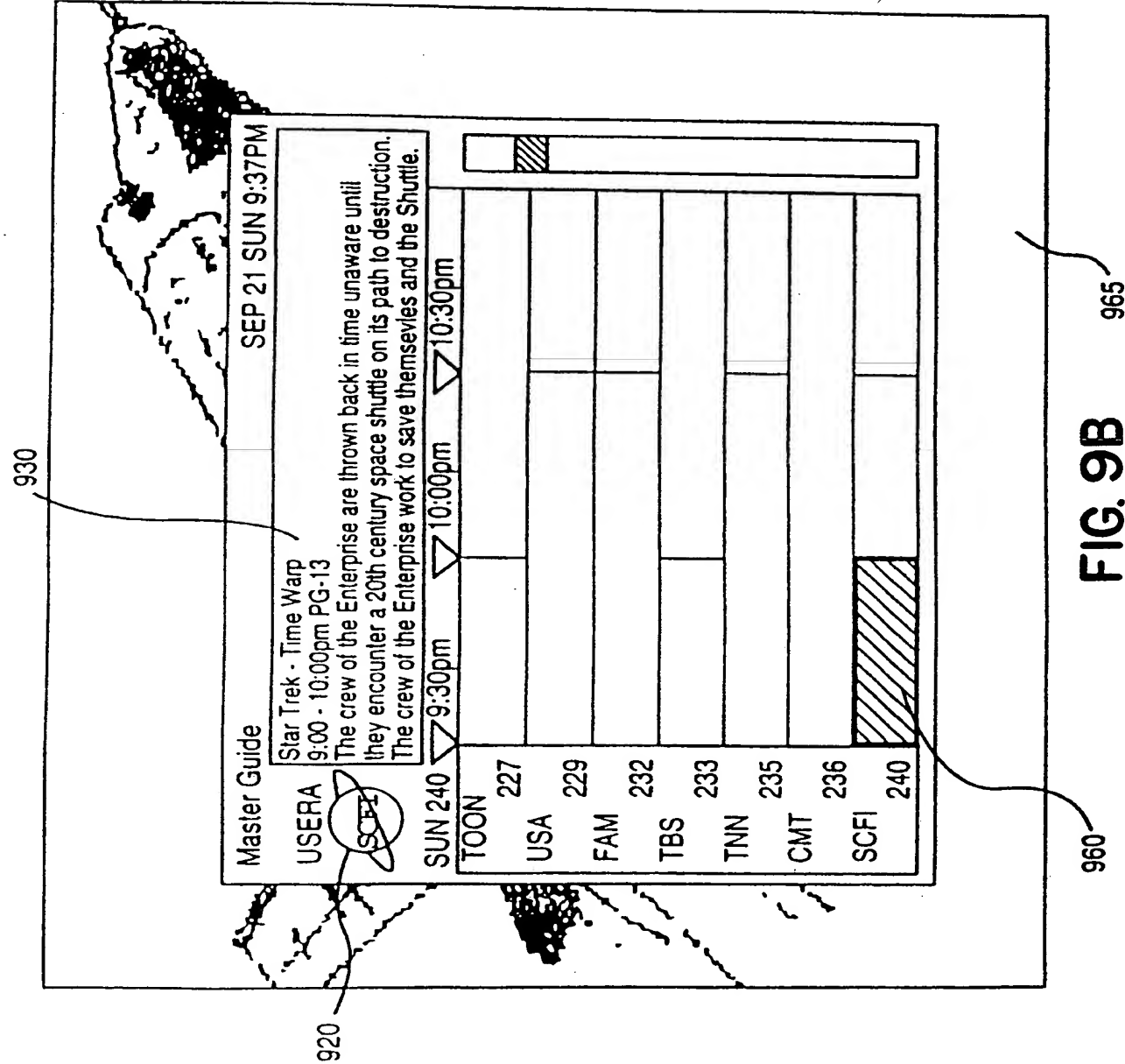


FIG. 9A



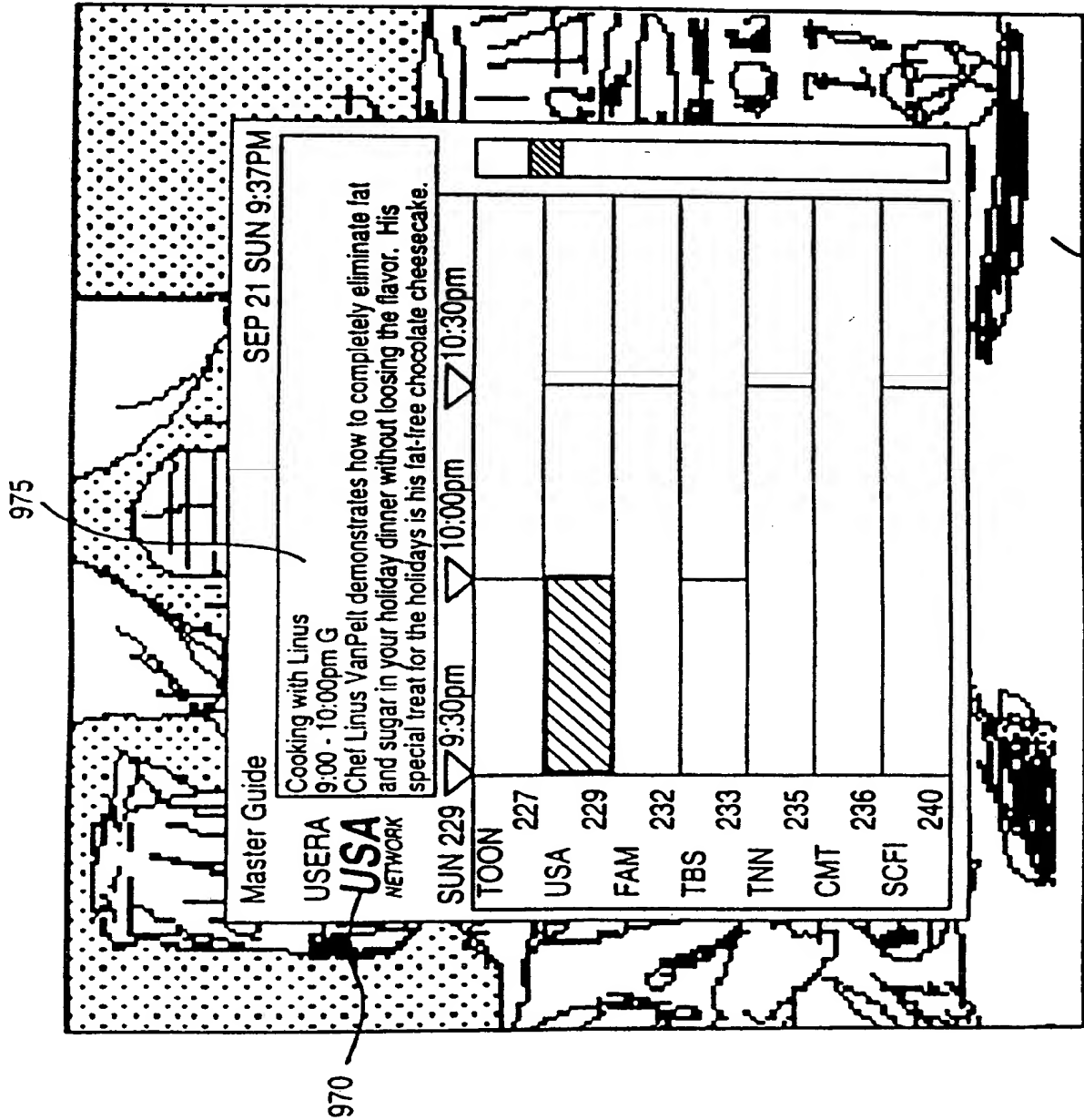


FIG. 9C



12 / 26

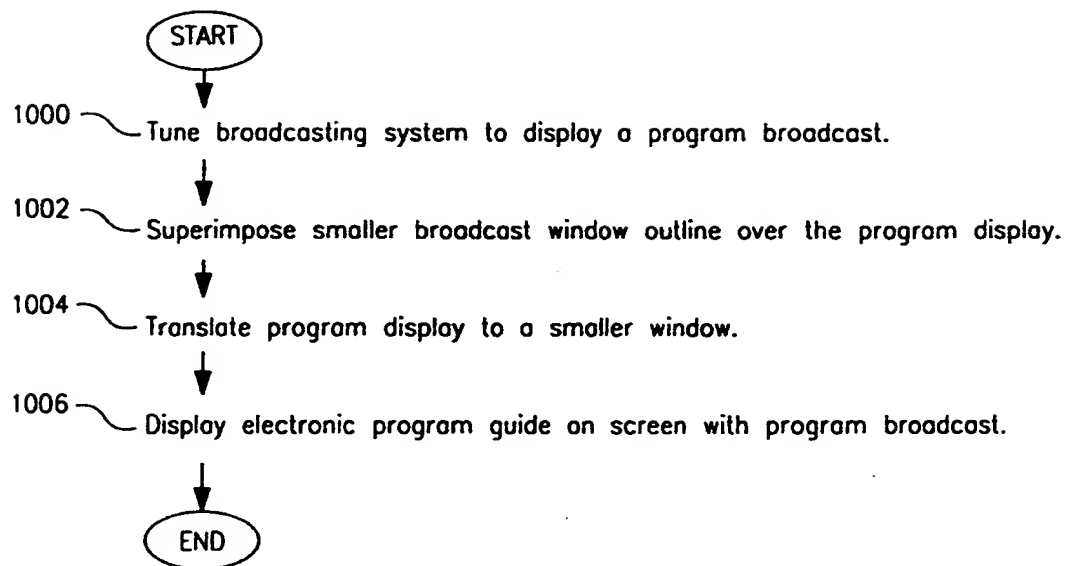


FIG. 10



FIG. II

1102

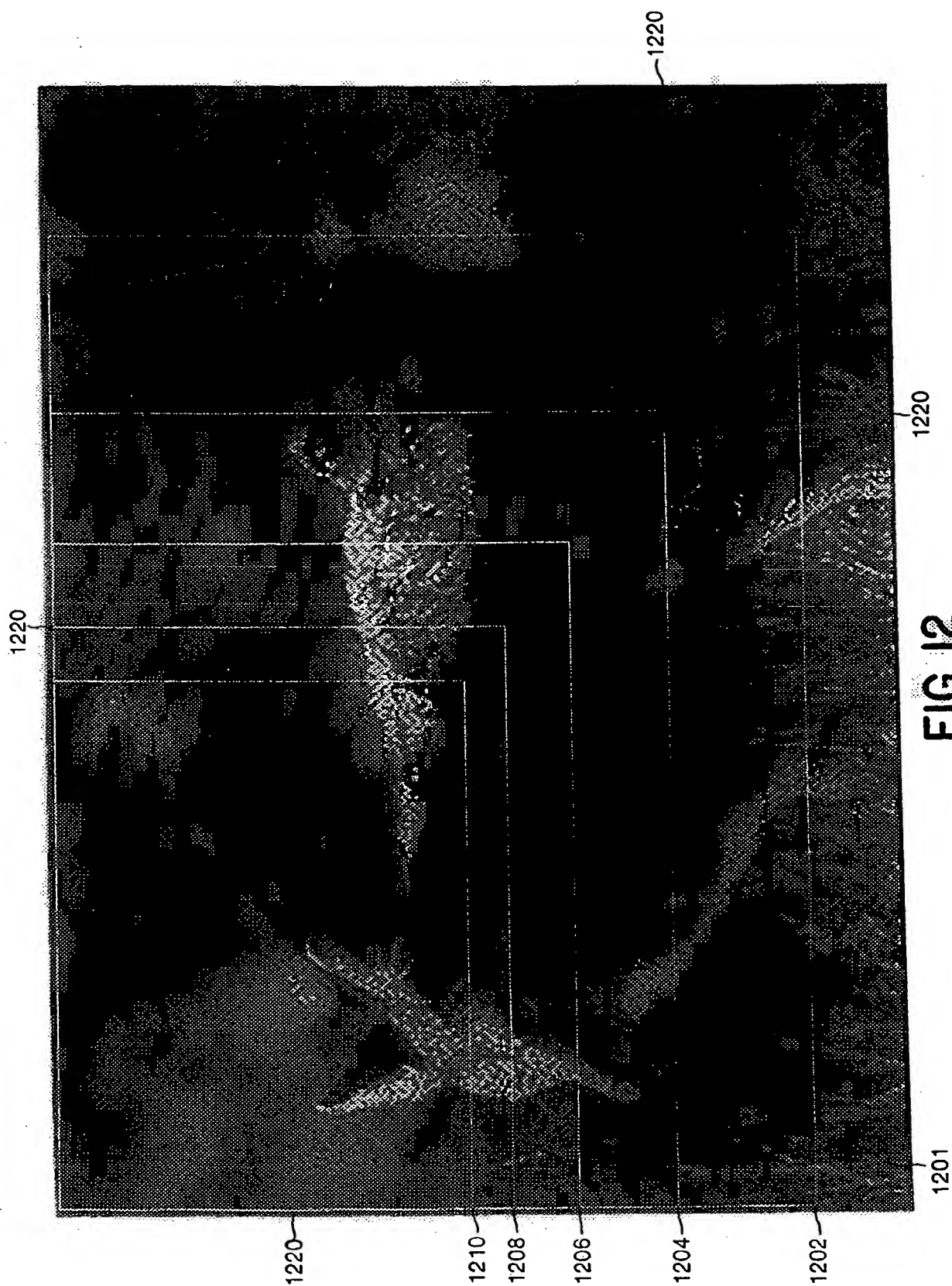


FIG. 12

1320 1328 1350 1352 1356

**TBS** 233TBS

**National Geographic Explorer**

Explorer meets dwellers in Canadian forest. Coyotes, deer, owls, and various small creatures.

7:00PM 7:30PM 8:00PM

256	A&E	Law & Order	Highlander
212	TNT	WCW Wrestling	The Jerk
250	TBS	National Geographic Explorer	American...
202	CNN	Larry King Sports	Crossfire
980	HBO	Tommy Boy	Major...

1310 1340 1338 1342 1330 1301 1332 1334 1380

FIG. 13

16 / 26

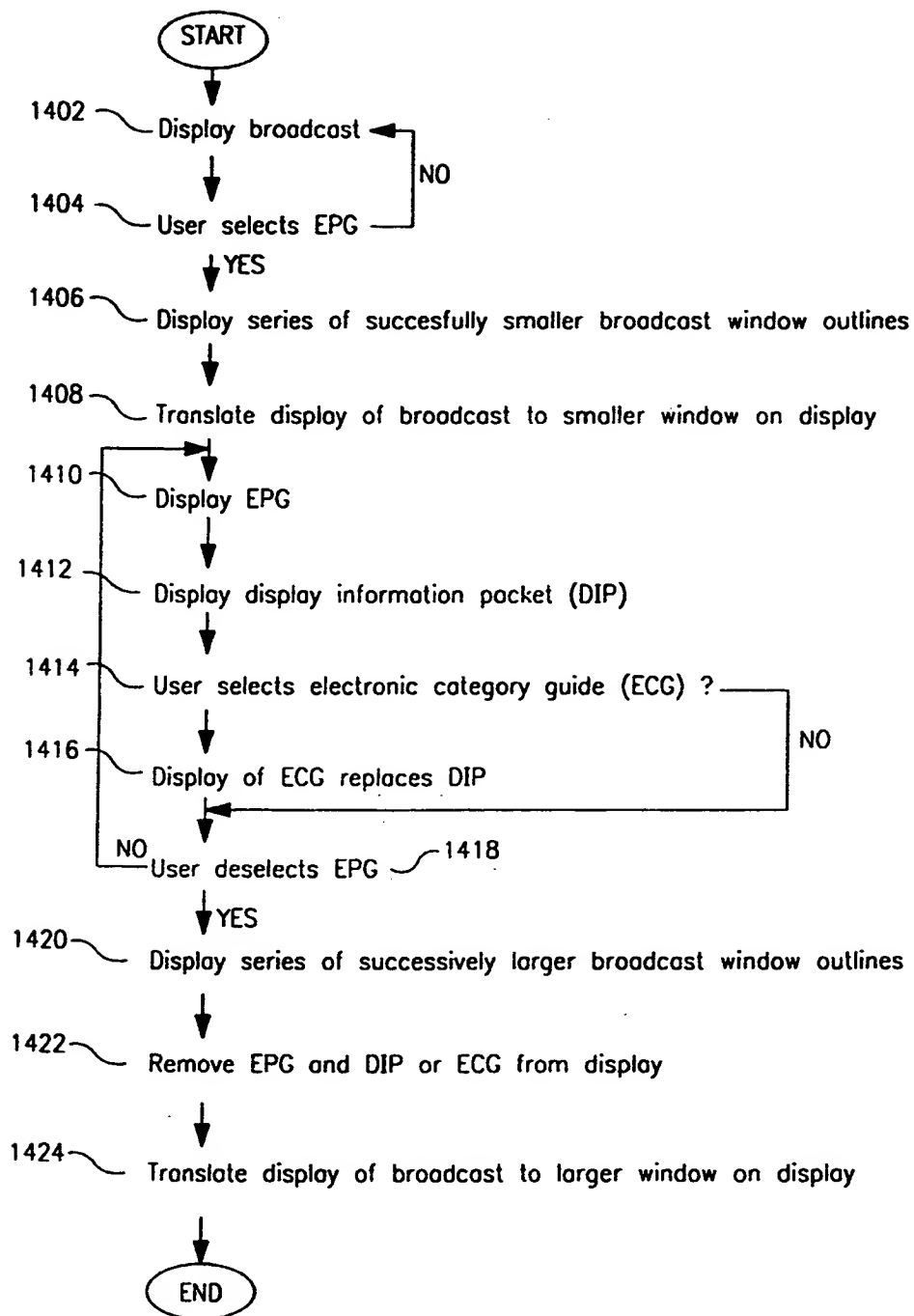



FIG. 14

1502



**TBS**

...models dwell in ...  
...desire, only, and ...  
...order, paper, ...  
...all (sub) ...  
...National Geographic Explorer ...  
...PO BOX 1124 XXXX New York ...  
...without web site, www ...

MON APR 20		7:00PM		7:30PM		8:00PM	
756	A&E	Law & Order		Highlander			
212	TNT	WCW Wrestling		The Jerk			
		National Geographic Explorer		American			
202	CNN	Larry King	Sports	Crossfire			
980	HBO	Tommy Boy		Major			

FIG. 15

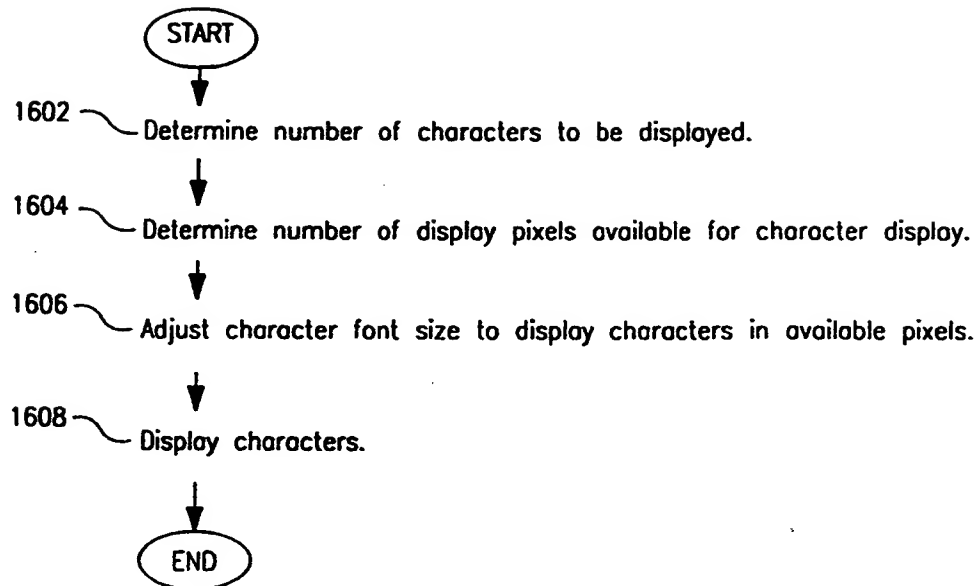


FIG. 16

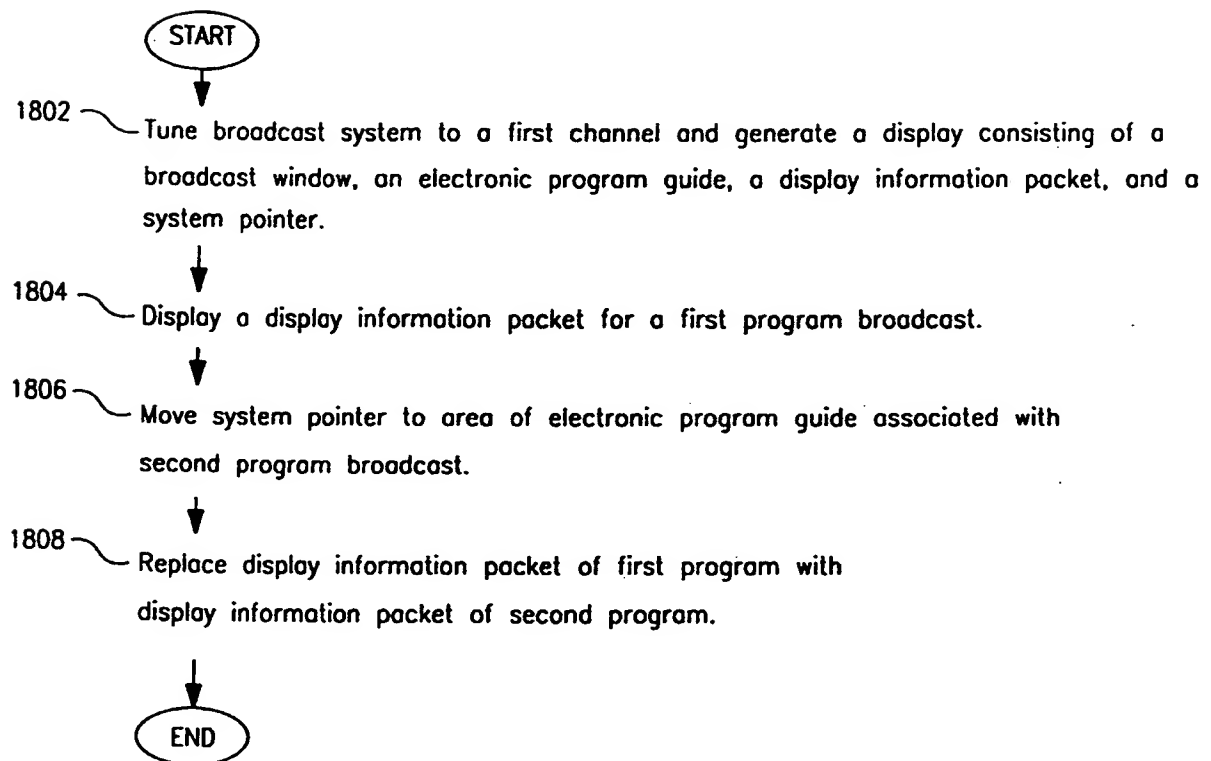


FIG. 18



19/26

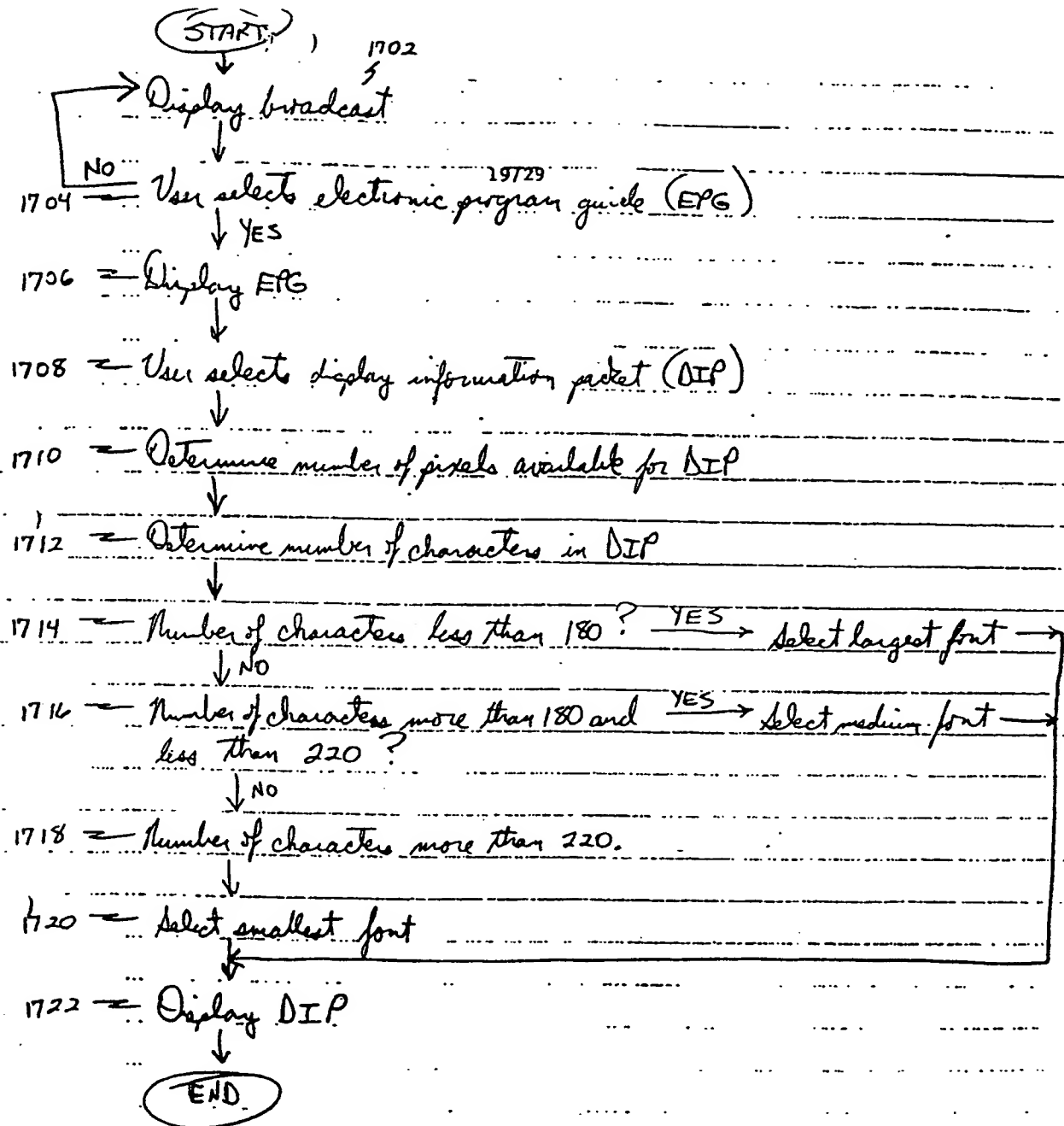


FIGURE 17



20 / 26

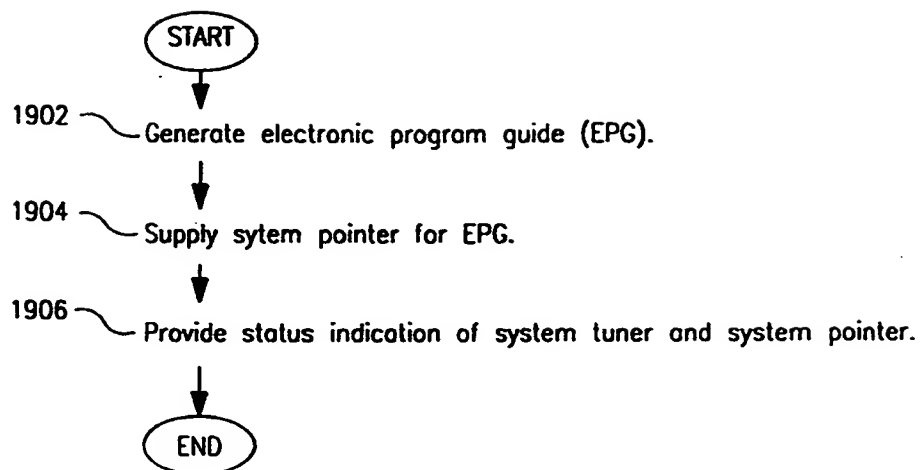


FIG. 19

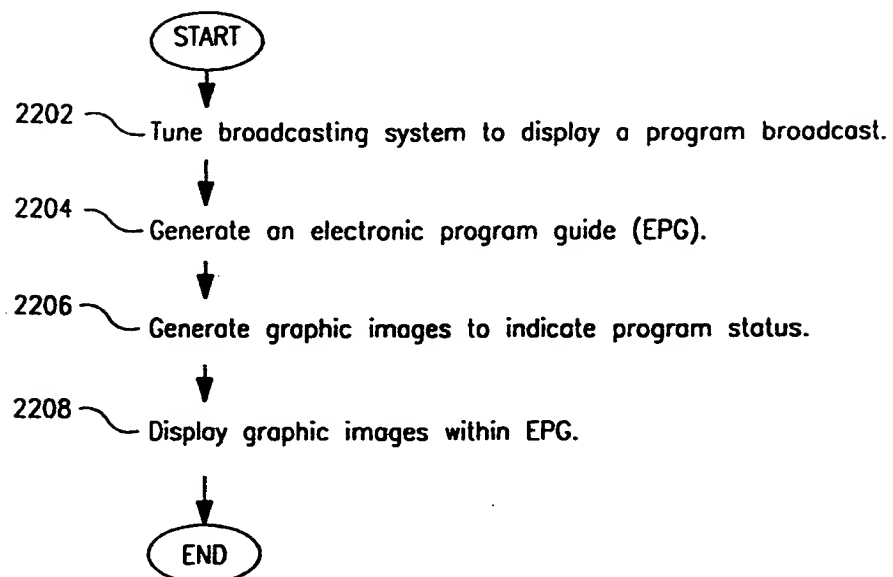
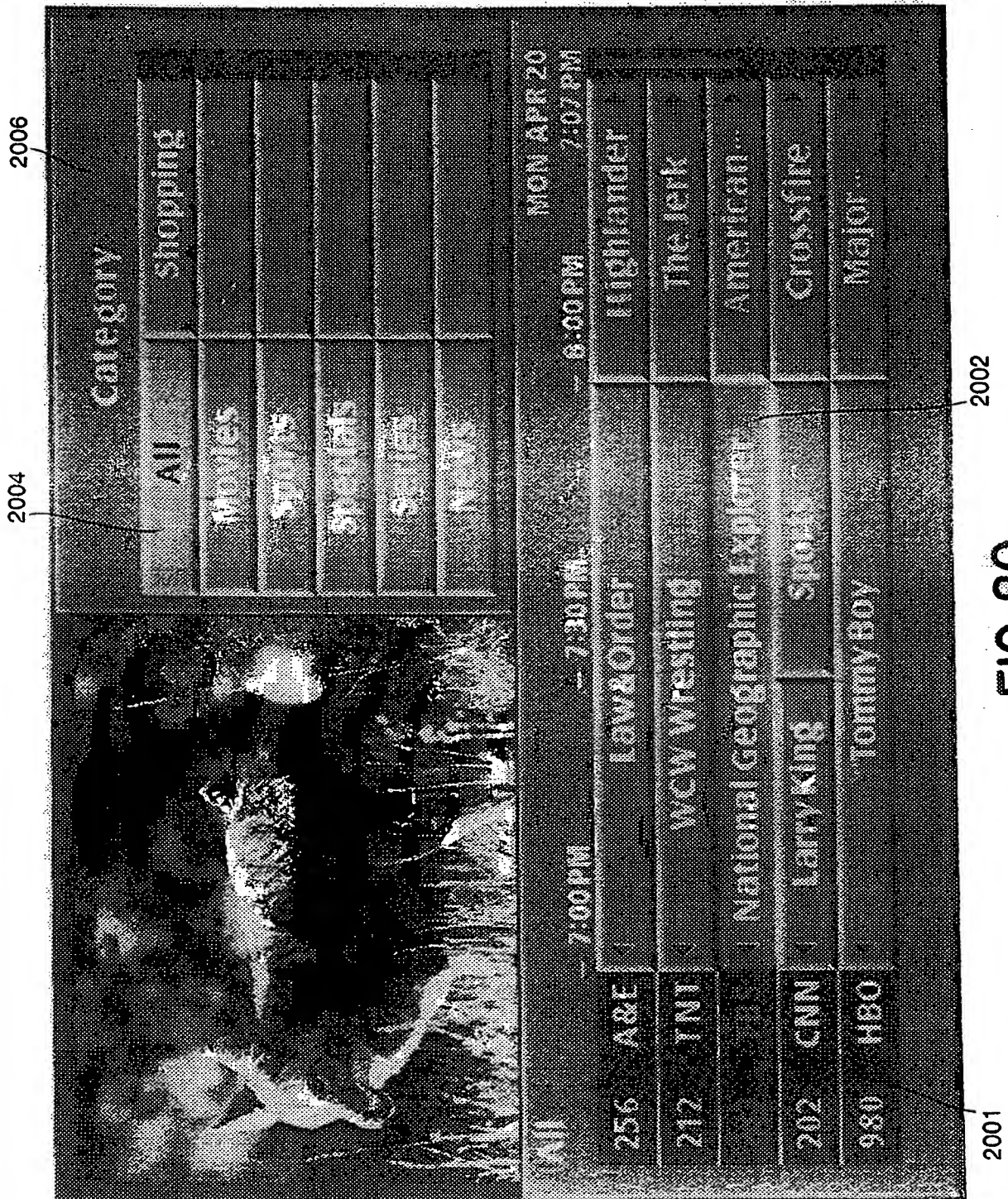



FIG. 22

21 / 26



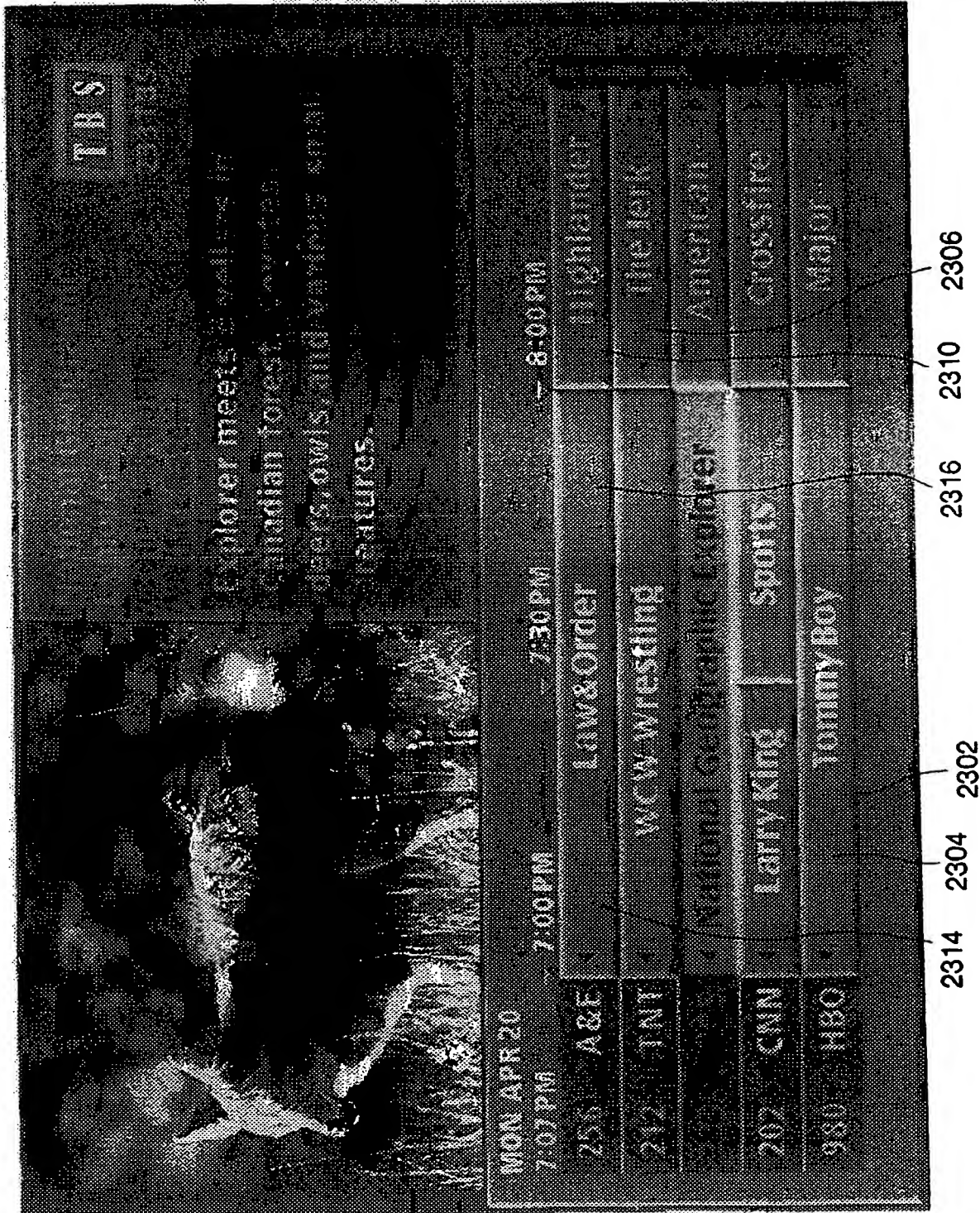
22 / 26

2108 2106 2102 2160

		Category: Sports	
All		All	Hockey
		Baseball	Racing
		Basketball	Skating
		Boxing	Soccer
		Football	Tennis
		Golf	Wrestling
MON APR 20			
7:00 PM		8:00 PM	
All		Law & Order	Highlander
256 AGE			
212 TNT		WCW Wrestling	The Jerk
		National Geographic Explorer	American
202 CNN		Larry King	Crossfire
198 HBO		Tommy Boy	Major

2104 2150 2152

FIG. 21



24 / 26

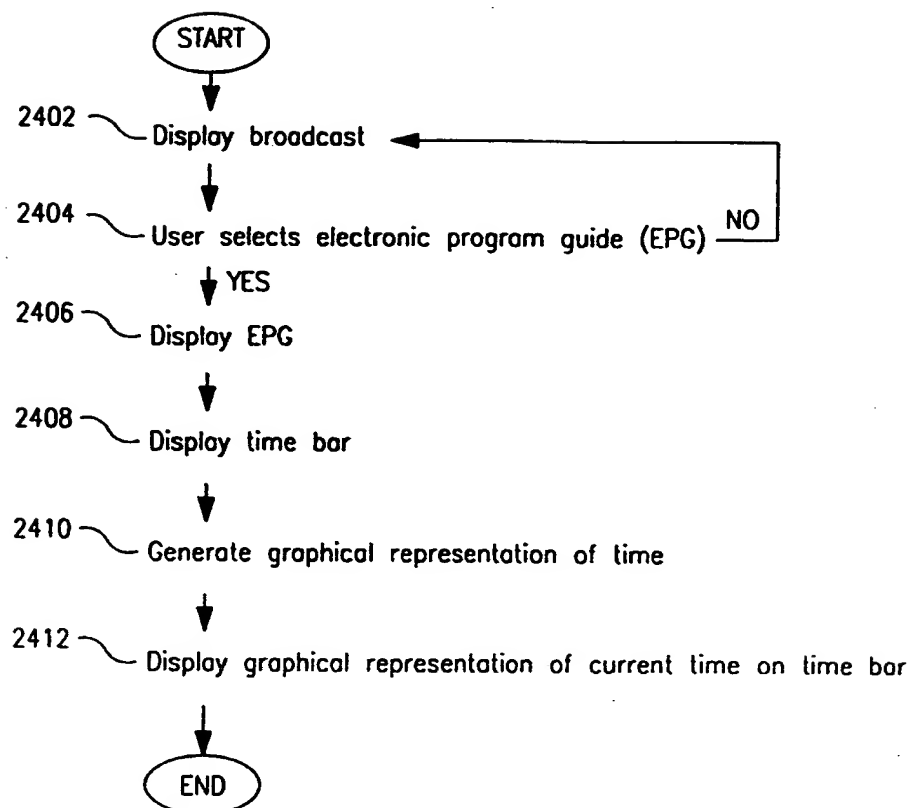


FIG. 24

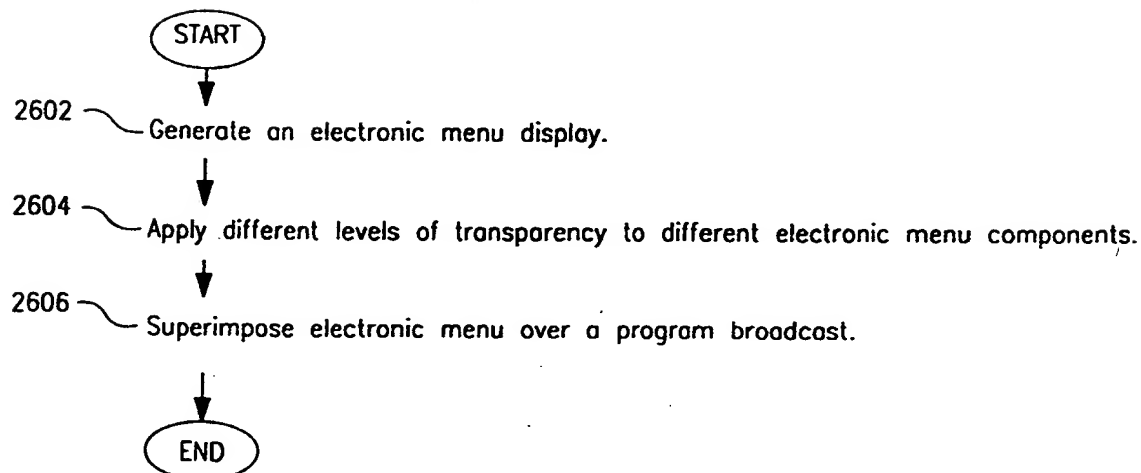


FIG. 26



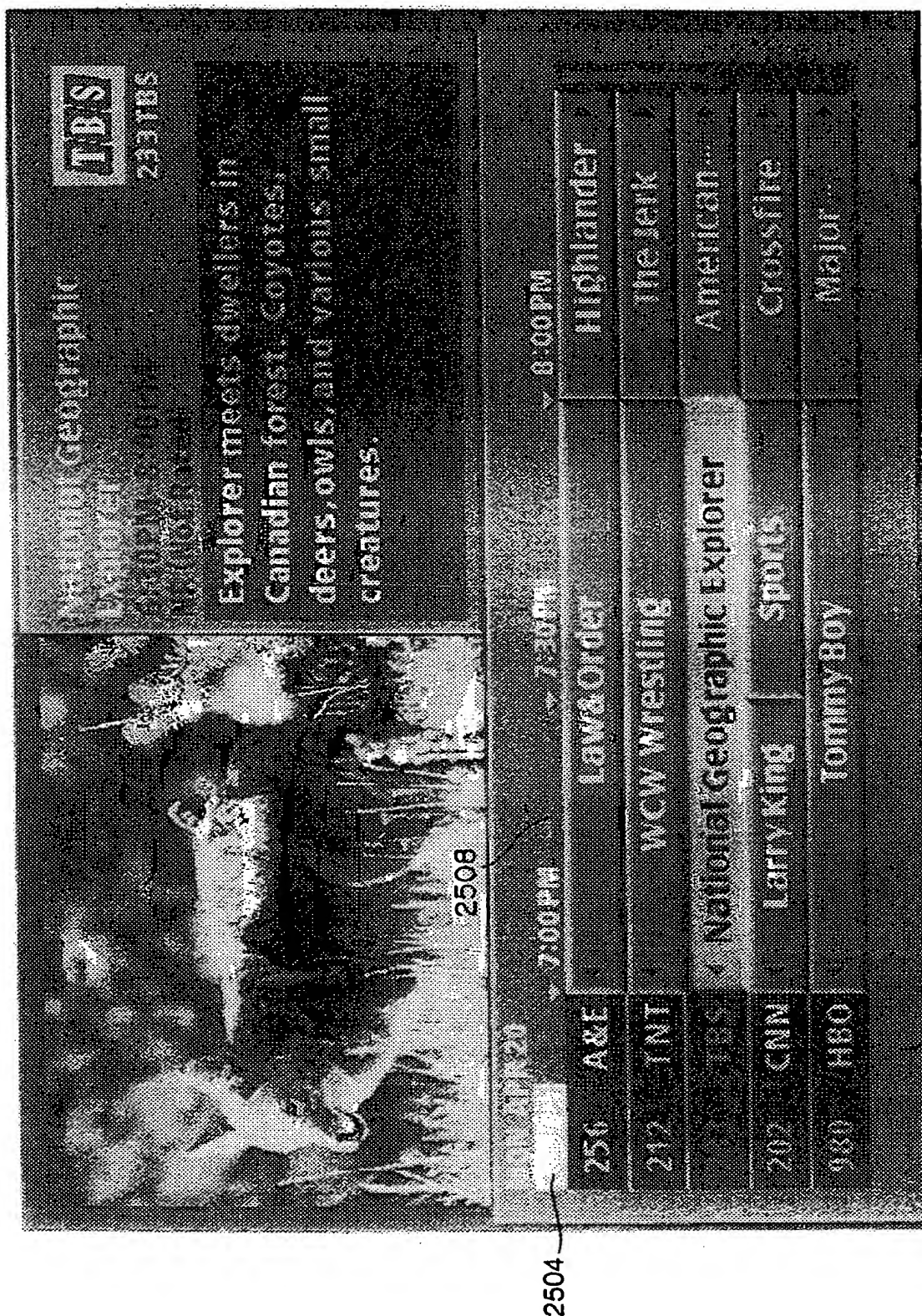
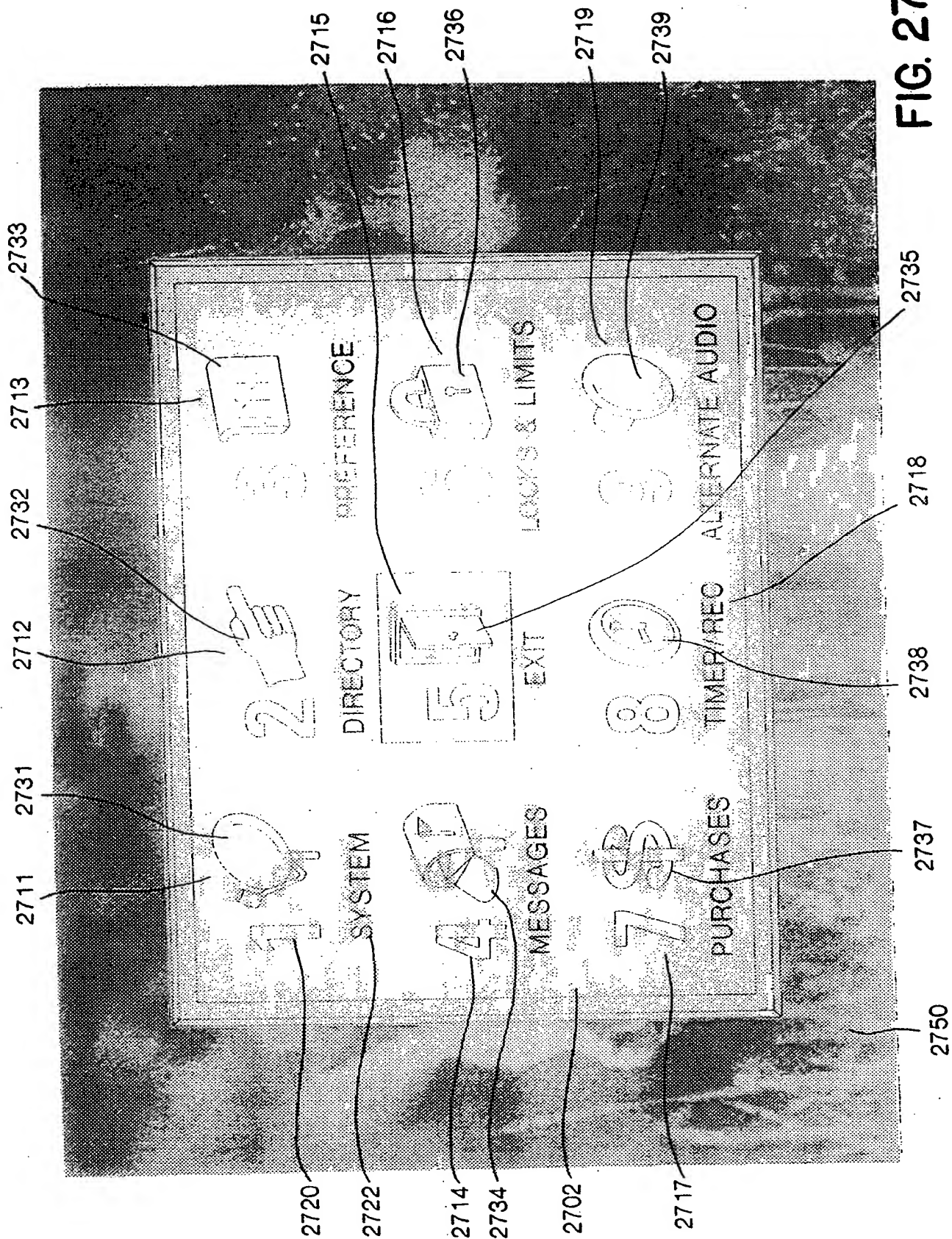


FIG. 25



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US98/21991

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(6) :H04H 1/02; H04N 5/445, 5/50, 7/08, 7/10

US CL :Please See Extra Sheet.

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : Please See Extra Sheet.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,585,838 A (LAWLER et al) 17 December 1996, see whole document.	1-57
X	US 5,594,509 A (FLORIN et al) 14 January 1997, see whole document.	1-57
Y	US 5,625,406 A (NEWBERRY et al) 29 April 1997, see whole document.	1-57
Y	US 5,650,826 A (EITZ) 22 July 1997, see whole document.	1-57

☒ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
*A* document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
*B* earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*A* document member of the same patent family
*O* document referring to an oral disclosure, use, exhibition or other means	
*P* document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

29 DECEMBER 1998

Date of mailing of the international search report

25 FEB 1999

 Name and mailing address of the ISA/US  
 Commissioner of Patents and Trademarks  
 Box PCT  
 Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

JOHN W. MILLER

Telephone No. (703) 305-4795



**INTERNATIONAL SEARCH REPORT**International application No.  
PCT/US98/21991**C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,559,548 A (DAVIS et al) 24 September 1996, see whole document.	10, 11, 14, 18, 19, 24, 31-34, 44- 47, 50, 51, 56, 57
Y	US 5,585,866 A (MILLER et al) 17 December 1996, see whole document.	10, 11, 14, 18, 19, 24, 31-34, 44- 47, 50, 51, 56, 57
Y	US 5,589,892 A (KNEE et al) 31 December 1996, see whole document.	10, 11, 14, 18, 19, 24, 31-34, 44- 47, 50, 51, 56, 57

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US98/21991

## A. CLASSIFICATION OF SUBJECT MATTER:

US CL :

345/327; 348/10, 461, 473, 565, 570, 906; 455/6.2

## B. FIELDS SEARCHED

Minimum documentation searched

Classification System: U.S.

345/326, 327; 348/6, 10, 11, 461, 468, 469, 473, 552, 563, 564, 565, 566, 567, 569, 570, 906; 455/3.1, 6.1, 6.2

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☒ FADED TEXT OR DRAWING
- ☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☒ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**